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THE GEOGRAPHICAL JOURNAL

Vol. LXIV No. 3 September 1924

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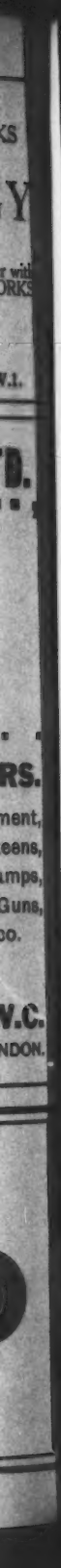


The Geographical Journal

Vol. LXIV No. 3 September 1924

CENTRAL SPITSBERGEN AND NORTH-EAST LAND

(Results of the Merton College (Oxford) Expedition to Spitsbergen, 1923.)

Read at the Meeting of the Society, 2 June 1924.

I. THE SLEDGE JOURNEY

R. A. Frazer

Nomenclature and History.

THE choice of a title for the present paper was complicated by a doubt whether the archipelago of Spitsbergen possesses a genuine centre. On maps the main island is West Spitsbergen. North-east Land, the second largest of the group, lies correctly to the north-east, but this convenient notation is not extended. In literature the term Eastern Spitsbergen is normally appropriated for the coasts of Stor Fjord, including Barents and Edge Islands; whereas Central Spitsbergen oscillates conveniently across a strip of West Spitsbergen which lies between latitudes 78° and 79°. The difficulty was to find a sufficiently terse title for a paper dealing both with North-east Land and with the north-eastern sector of West Spitsbergen—a sector which encroaches both upon Ny Friesland and upon Garwood Land.*

On the historical side the areas will be considered jointly and briefly. The references are confined to relatively modern scientific expeditions and journeys, and have been selected primarily with a view to elucidation of an obscure nomenclature.

The modern scientific exploration of North-east Spitsbergen developed gradually from Sir Edward Sabine's pendulum observations of 1823, and his subsequent proposal of 1826 that the British Government should organize an expedition to measure an arc of the meridian on Spitsbergen. The credit for the accomplishment of this project falls to the Swedes and Russians. In 1861 Dr. Otto Torell's great Swedish expedition laid the foundations. A preliminary chain of triangles repre-

* This name was given by Sir Martin Conway. It seems undesirable that a relatively small portion of Spitsbergen should be dignified with the name of a "Land"; and though the name is used here for convenience, it must not be taken as accepted by the Society.—ED. *G.J.*

senting the northern half of the proposed network was staked out by the physicist K. Chydenius, of Finland; his triangles extended from Rose Island (lat. 80° 48′ 40″) southwards through Hinlopen Strait, and terminated on a peak lying well in the interior of Ny Friesland (*Proc. Roy. Soc.*, vol. 12, p. 658). Subsequently this peak became known as Mt. Chydenius. In 1864 a further Swedish expedition, under A. E. Nordenskiöld and N. C. Dunér, extended that network along Stor Fjord to the South Cape of Spitsbergen.

The next event of note was the wintering of the Swedes under A. E. Nordenskiöld in Mossel Bay, 1872–73. During the spring of 1873 a sledge journey, mainly on shore ice, was made from Cape Platten to within some 20 miles of Cape Leigh Smith. Thence Nordenskiöld worked southwards across the ice of North-east Land. Before reaching Cape Mohn he was obstructed by the occurrence of a sequence of remarkable ice-canals, 30 to 100 feet wide, and 30 to 40 feet below the general ice-level. He returned westwards to Wahlenberg Bay. No other extensive inland journey has been accomplished in North-east Land. An interval of twenty-four years brings us to Sir Martin Conway's and Prof. Garwood's pioneer sledge journey of 1897, which deleted the inland ice from the interior of West Spitsbergen and showed that the southern mountains of Ny Friesland were accessible from Klaas Billen Bay. In 1898 a German expedition (*Geog. Journ.*, vol. 13, p. 199), under Captain Rüdiger, circumnavigated North-east Land, correcting the positions of several capes; this expedition resulted in the interesting discovery of a breeding station of the Ivory gull amongst the Wiches Islands. In the same exceptionally good ice year the Swedes, under E. Jäderin, succeeded in erecting thirteen of the northern beacons for the Arc of Meridian Survey. An enlargement of the original Mt. Chydenius into a series of peaks dates from that expedition. From Mt. Loven the astronomer, V. Carlheim-Gyllensköld, recognized through the telescope, in the position accorded to the point Chydenius, a whole mountain range, to the seven principal summits of which he assigned the names Newton, Clairaut, MacLaurin, Laplace, Legendre, and Poincaré (*La Géographie*, 1901, 3, p. 306). Thus, from 1898 there emerges a Chydenius range, culminating in Mt. Newton, still the highest measured summit in Spitsbergen: the original Mt. Chydenius was left unidentified, but it was, unfortunately, not wholly forgotten. Thenceforth in literature Mt. Chydenius becomes ubiquitous; it appears to have been located in many parts of Ny Friesland.

The Russo–Swedish geodetic observations were commenced in the summer of 1899 and completed in 1902. Success depended upon attainment of some station in the Chydenius Range. Two unsuccessful efforts to reach such an objective were made during the period 1899–1900, in both cases by Swedish parties. The first, by T. Rubin and H. Fraenkel, in August 1899, was from East Fjord. After a three days' journey in

bad weather a pass of 4166 feet was reached, affording a glimpse of a seemingly impassable range to the east, presumed to be the Chydenius Range; from here the party returned. In May of the following year E. Jäderin, with five men, renewed the onslaught by a journey from Treurenberg Bay southwards across the Ny Friesland ice shelf, but returned unsuccessful. The prize fell to a Russian detachment, under A. S. Vassiliev, and including Helge Backlund, who journeyed in August 1900 from Klaas Billen Bay and followed the western flank of the Svanberg massif. Mt. Newton and neighbouring peaks were ascended, but their summits proved to be ice-bound and unsuitable as survey stations. The signal was ultimately erected some 7 miles to the south-east of Mt. Newton, on a prominent rock shoulder of a mountain, named by its discoverer Mt. Chernishev. In August 1901 Vassiliev returned and completed his geodetic work in the interior. With the foregoing bare references to a really remarkable series of inland travels, we leave the Arc of Meridian Survey.

The interior of Ny Friesland was revisited in tragic circumstances in 1913, when Captain Arve Staxrud carried out two rapid overland journeys to Treurenberg Bay, in order to relieve the ill-fated German expedition of 1912. No survey work could be attempted, but the descriptive account, with photographs, is valuable. The German expedition need only be recalled for its disastrous attempt on North-east Land. The programme appears to have been a north-to-south crossing of the island. A party of four were put down on the sea-ice some 3 nautical miles east of the North Cape; until last year no wholly authentic trace of this party had come to light. This unfortunate episode must conclude the history prior to the Oxford University Expedition of 1921, when N. E. Odell, with Dr. G. T. Longstaff and the writer, travelled north-east from Klaas Billen Bay, and reached a vast glacial confluence lying south-east of Mt. Chernishev. The outlet of this confluence to Hinlopen Strait remained undetermined owing to insufficient available time, and the party returned to the west coast.

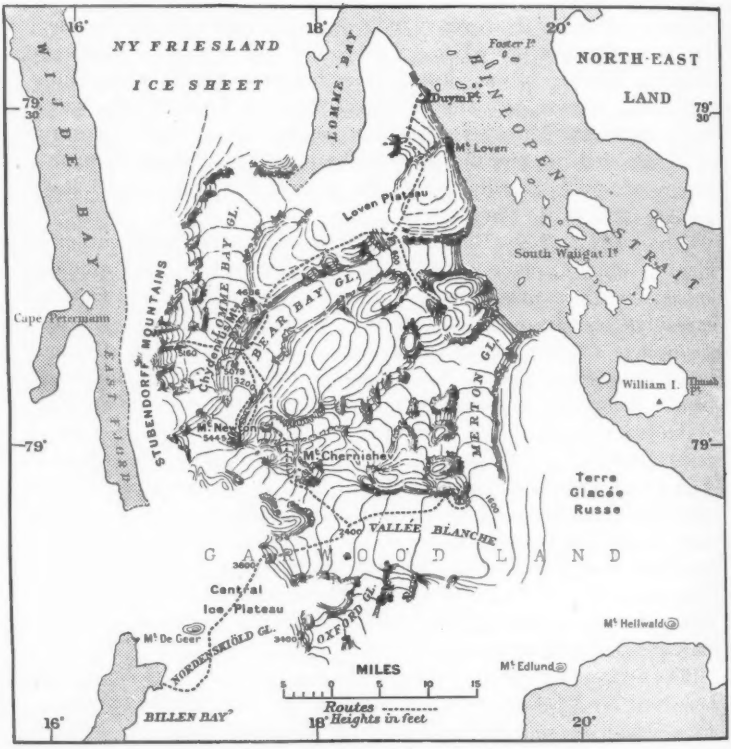
The list is admittedly incomplete: the separate histories of North-east Land and Ny Friesland would each fill a volume. But the references given should be sufficient to render the descriptions which follow at least intelligible.

Notes on the Physiography of Ny Friesland and Garwood Land.

Ny Friesland will be defined here as the country extending north of the 79th parallel and lying between Hinlopen Strait and Wijde Bay. To the south lies Garwood Land. This distribution of country may perhaps conflict slightly with Sir Martin Conway's original northern confines to Garwood Land (*Geog. Journ.*, vol. 12, p. 137), but some more precise limitation has become desirable. Under the new definition

the Chydenius Range (including Mt. Newton) lies wholly in Ny Friesland, whereas Mt. Chernishev is in Garwood Land.

The complex topography of these areas is most conveniently described in terms of four major plateaux of highland ice,* disposed as a quadrangle. Two lie in Ny Friesland on the peninsula west and east of Lomme Bay; they will be referred to respectively as the Ny Friesland Ice-sheet and the Loven Plateau. The others lie in Garwood Land. The first is the so-



The route of the sledging parties.

called Central Ice Plateau at the head of the Nordenskiöld Glacier, and the second comprises the vast icy wastes north-east of Hellwald, described as the "terre glacée russe" by Vassiliev.†

Concerning the Ny Friesland ice-sheet our party obtained no first-hand information beyond distant inspection. Along the coasts the ice,

* This type of glaciation is understood as "a thin but continuous ice-sheet with its upper surface conforming to a considerable extent to the major irregularities of the land on which it rests" (see Wordie, *Geog. Journ.*, vol. 58, p. 38).

† *Miss. Scient. pour la Mesure d'un Arc de Méridien*, Tome I. Sect. 116, p. 10.

CAMP ON THE LOVEN PLATEAU

NEAR DUYN POINT

WIJDE BAY PEAKS FROM MT. IRVINE

BEAR BAY GLACIER

in general, terminates in a distinct horizon above steep rock walls and buttresses, only rarely finding a channel for escape. On the north-east coast alone the drainage is relatively free, resulting in the extensive glacier front bordering Hinlopen Strait. Inland, however, the plateau terminates, or rather degenerates, under very different conditions. Its edge is roughly traced out by a lofty range pointing north and south, which throws out a sequence of easterly ridges towards the great Lomme Bay Glacier. In the north the summits of this range flatten off to the general level of the ice-sheet; here the more precipitous mountain faces are crested with vertical ice-cliffs, whilst the milder slopes are wholly, or partially, flooded with the ice. At about the latitude of Cape Petermann the peaks become pointed and bolder, rising to above 5000 feet, and a maze of comparable peaks * evidently bordering Wijde Bay intrude from the west. At this stage the ice-sheet loses its individuality.

The Loven Plateau, intersected by occasional depressions and valleys, extends in a south-westerly direction from Mt. Loven, and tails off into the line of high peaks which separates the Lomme Bay and the Bear Bay glaciers. From its orientation and position this range must be identical with the Chydenius Mountains as described by Gyllensköld (see Nomenclature and History), although, most incongruously, Mt. Newton lies isolated on the opposite bank of the Bear Bay Glacier, hardly constituting a legitimate unit in the range. Indeed, this mountain is more intimately allied to the icy highlands which border the Bear Bay glacier on the south.

The ice from Mt. Newton is drained by two glaciers in addition to the Bear Bay Glacier; the first, a narrow steep-walled valley glacier flowing eastwards, and the second—somewhat more open—flowing south-eastwards. Each of these latter glaciers debouches into a wide white valley, whose nomenclature appears to be attended with some confusion. At least four irreconcilable " wide white valleys " have been described by travellers—perhaps two by Sir Martin Conway, and two by the Russians; but details here would only enhance the confusion. There appears to be a real need for one " vallée blanche " *par excellence*, and the name should undoubtedly be reserved for the great glacial confluence south-east of Mt. Chernishev, which Sir Martin Conway and Prof. Garwood viewed from the head of a western tributary during their inland journey of 1897.

This " vallée blanche," which flows in an easterly direction, is responsible both for the eastern drainage of the Central Ice Plateau and for part at least of the western drainage of the " terre glacée russe." At the western extremity of the latter plateau the ice of the confluence turns an abrupt corner, and connects with Hinlopen Strait. The outlet—a

* " Montagnes belles," Vassiliev, *ibid.*, p. 10; Stubendorff Mountains, Swedish expeditions, 1899, 1900).

typical valley glacier joined eventually by a second broad tributary* from the west—was examined by our party last year, and will be described as the Merton Glacier.

The 1923 Expedition: Description of Sledge Journey.

The Merton College Expedition, under the general direction of F. G. Binney, was organized both for reconnaissance of North-east Land and for continuation of previous work in West Spitsbergen. The first section of this paper relates to the sledge journey, and the second will describe the cruise of the *Terningen*. Our sledge party consisted of N. E. Odell (leader and geologist†), A. C. Irvine and G. Milling, both of the Oxford Boat, and the writer (surveyor). The first two are now on Mt. Everest, whilst the third is believed to be re-crossing the Atlantic *en route* for Spitsbergen, which accounts for my appearance upon the platform to-night.

In the hope that conditions would allow some inland exploration of North-east Land, prior to the landing on Ny Friesland, the sledging plans were left somewhat elastic. Preparations for the dual project were correspondingly complex, but a description may be omitted. On our arrival at the Foster Islands at the end of July an unbroken ice frame, several miles wide, blockaded the North-east Land shore. On the western side of the strait ice was rapidly driving up, and delay was unwise. After twenty hours without improvement our party turned to West Spitsbergen, and at midnight on July 31, the four were ashore with two sledges and full pack at Duyn Point.

Here the ruffled waters of Hinlopen Strait take shelter behind a rocky promontory and fill a small lagoon. A line of buttresses breaks the vast glacier front which edges the coast, and from the relatively level ice surface 500 feet above a snowy tongue sloped to within 100 yards of the lagoon, revealing a convenient way inland. The first camp was set amongst strange contrasts. From the tent we looked to the sea-fowl bustling in the sun by the still lagoon, and beyond to the ice borne by the turbulent race in the open strait. Snow and Alpine blossoms were sharing nooks in the boulders scattered around.

A word as to the equipment. In general the stores were proportioned from a list which had already proved satisfactory in 1921, with a party of three (see *Geog. Journ.*, Nov. 1922, p. 324). Food rations were based upon a standard Shackleton diet, of which the main items were pemmican, sugar, chocolate, and biscuits, amounting to 136 ozs. daily for a party of four. Experience has shown, however, that the full Antarctic pemmican ration is excessive under Spitsbergen conditions, and that a proportion of this weight may profitably be transferred to

* Itself connecting with the steep-walled eastern glacier from Mt. Newton: see *supra*.

† The geological results will be published elsewhere.

somewhat more palatable items such as oatmeal, glaxo, and tea. On expert medical advice a small supply of lemon-juice was included. A three-valve wireless receiver was taken—doubtless an innovation for sledges. The set was designed and constructed by Mr. Relf, primarily for use in North-east Land, where it would have been indispensable. In Spitsbergen it proved invaluable, by keeping the party informed of outlying weather conditions and of the movements of the sloop. Both the sledge sails and canvas Shackleton boots were originally intended for the dry wind-swept ice of North-east Land. On the utility of the former in Spitsbergen our opinions were somewhat divided. The boots, moreover, rapidly deteriorated under the constant attrition due to crampons and bindings, and barely survived the journey. For use under the special conditions the uppers should be protected with leather.

The journey was to conform with certain objectives: Mt. Newton, reputedly the highest viewpoint in Spitsbergen; Mt. Chernishev, the Russian geodetic station of 1902; the "vallée blanche," whose outlet had obscured itself against our inspection from the Lion Nunatak in 1921; and lastly, Klaas Billen Bay, our *rendezvous* with the *Terningen* at midnight, August 29. The general direction was south-west, and the direct distance 80 miles. The early marches showed that much of the distance would in effect be trebled; the load was little short of 1000 lbs., and unmanageable except by relay work. Indeed, the cloudless summer was fast despoiling the lower glacier reaches, and we toiled over mud and grit, floundered in brown snow bogs, and fruitlessly skirted the streams. Happily the slopes were gentle, and crevasses few.

For about 8 miles we worked south along the coast shelf, with high ice and flat-topped outcrops to the west intercepting the view of Lomme Bay. Then our fortunes were baulked in a startling fashion. The glacier had curled westwards into a dreary valley separating the now rapidly rising coast from an ice-dome which crept to some 1800 feet and overlooked Lomme Bay. The valley, over a mile in width, had suggested itself as a natural line of advance; but it was wholly impassable. From each wall of the valley the ice fell away in dilapidated terraces, and already the sledges moved with a hollow rumble over insecure giant slabs. Further ahead the crazy pavements were piled high with a wild confusion of square-cut blocks and columns, and sloped to a wicked morass in the central basin. This scene of chaos told of the bursting of a glacier lake but recently filling the valley. Two narrow discontinuous causeways of ice, suspended on the border slopes, revealed the former water-level; from all sides streams were hurrying noisily into the morass, and still escaping by some mysterious channel. A deep diapason boom pervaded the air, which we traced in time to a glacial lakelet concealed at a lower level to the east, and in a state of violent upheaval. At not less than two centres, great spouting whirlpools were periodically distributing thousands of gallons of muddy water into the

reservoir, and a torrent ultimately carried the turbid overflow down to Hinlopen Strait. The distant morass was undoubtedly supplying the whirlpools through some connecting tunnel in the ice; but only a phantom remained of the colossal spectacle which must have accompanied the first break-away of the waters.

Leaving the lower glacier, we perforce laboured up a branch to the left, and ultimately found ourselves on the undulating ice of the Loven Plateau. During the four days which were fully occupied in crossing this dreary ground to the Bear Bay glacier we forfeited sun and rock; on rare occasions only, a fragmentary glimpse of cliffs beyond Lomme Bay filtered through the fog. The general course was south-westerly, and the altitude varied little from 1500 feet. Of the Swedish geodetic stations on Mt. Loven we saw nothing; no doubt some definite summit exists, but it was invisible. Our own impressions of this region are possibly unfortunate and prejudiced. When not actually progressing through water we travelled over an atrocious sticky surface, which incessantly caked the sledge runners. We vacillated between crampons and skis, discarding the former in the pious hope of preserving our canvas boots, and the latter when the additional embarrassment of a foot of snow plastered to the ski-sole became intolerable. The routine was at the best relay work, and at the worst immobility. One sledge was obdurate, and jammed with half the load in a mire. Later we returned 10 miles in driving snow and with excessive labour moved it 200 yards to a slightly drier site.

On August 9, with but half our effects, we reached rocks on the southern edge of the plateau. Two days later the clearing sky and a keen frost suggested a welcome improvement. From camp, with new interest, we looked down a narrow steep-walled valley to the play of sunlight on a vast glacier which appeared to flow east between well-marked ranges. Soon we had the rocks festooned with a rare assortment of garments, sodden and steaming beneath a cloudless sky. Whilst one Spartan added the clothes he was wearing to the pile preparatory to a sunbath, the others modestly retired to a neighbouring summit. Some 10 miles to the east lay Bear Bay—and a vast ice-front, arching between two lines of cliffs, marked the termination of the Bear Bay glacier. The latter, simulating the even sweep of a great high-road, brought the eye easily from the distant seascape to moraines and streams 1500 feet below, and as soon enticed it westward to a remote corner where clouds still rolled lazily between high peaks of the Chydenius group.

Two days were devoted to exploration of the ranges and branch valleys lying towards the coast. On the first occasion we followed the crest of fluted cliffs bounding the glacier on the north; the limestone terraces were often undercut, in places even perforated, and everywhere densely populated with birds, including the Ivory gull.

A visit with Odell to the southern border range proved more laborious.

The glacier was over 2 miles wide, and seamed with deep-cut, highly polished aqueducts, hardly amenable to skis. One of the series was designed to claim unwary victims. Its roof was undercut, attenuated to a wafer, and barely broken through. The fretted ceiling admitted a glimmer of daylight, which reflected diamond sparks from polished walls 10 feet apart and a torrent coursing over 30 feet below. Approaching the coast, we crossed in succession a dry branch glacier studded with pointed ice cones 4 feet high, and a minor snow-covered tributary rich in crevasses, into three of which we stumbled. The selected summit lay well out towards the coast, and gave a surprisingly expansive view.

There was nothing lofty or bold in the outlook, yet a strange charm in the midnight opalescence on Hinlopen Strait, and in the pallor resting above the sheen of ice-fronts and the loom of sea cliffs in North-east Land. Some 8 miles to the south lay a striking replica of Bear Bay and its glacier, and soon we guessed the solution to the riddle of 1921. The glacier thenceforth became known to us as the Merton Glacier; but our assumption that it did indeed represent the true outlet of the "vallée blanche" remained unconfirmed for many days. A diligent search revealed no fewer than four of the Russo-Swedish primary beacons: Thumb Point, Chernishev, Loven, and Svarta Berget. We remained engrossed for four hours, until Odell, who for some inscrutable purpose had removed both boots and socks, complained of cold. On the circuitous return his protracted exercises with a geological hammer no doubt restored his own circulation, and brought us back to camp equally wearied of a twenty hours' day. The others, in our absence, had recovered the refractory sledge-load from its mire on the Loven Plateau. Exactly how the necessary tractive force had been supplied remained obscure.

By midnight August 15 we had moved 18 miles south-west up the northern edge of the Bear Bay glacier, and reached the foot of a conical mountain, which may be that described as Mt. Hope.* Across the glacier a long line of granite precipices culminated some 6 miles away to the south in the summit of Mt. Newton. One of the party, who views good visibility as an excellent excuse from disagreeable camp duties, stole away and climbed Mt. Hope. The summit, at 5079 feet and comparatively isolated, commanded immense distances, but the display in the west was particularly imposing. Here was a magnificent array, truly Alpine, of high rock towers and interlacing glaciers, some of the peaks slender as aiguilles, others bluff and fringed with cornices of ice. The main Lomme Bay glacier swept by in the middle distance, its head concealed by peaks to the west, its full width obscured here and there by foreground ridges. Joined by comparable branches and minor tributaries, it splayed as a vast ice-belt towards Lomme Bay.

* Still to be identified with one of the peaks of the Chydenius Range.

South of the bay stretched the undulating Loven Plateau that we had but recently crossed. An isolated domed mountain stood at its western extremity, sentinel-wise, above the Bear Bay glacier—the advance guard of the Chydenius Range. The peak * which we had latterly ascended rises to 4686 feet, and is remarkably conspicuous from numerous viewpoints.

On the following day we separated into pairs. Odell and Irvine, fortified with instruments, disappeared for twenty hours in a westerly direction. Their reconnaissance extended for some 8 miles across the Lomme Bay glacier to the summit of a difficult rock peak † at the head of a tributary glacier, and proved fruitful both in geology and survey. Meanwhile Milling and I, after skiing across the Bear Bay glacier, had struggled up the steep crevasse-chequered eastern slopes of Mt. Newton. As was our custom, we gained the open crest hot with exercise at the chilliest hour. Abruptly the view disclosed itself, and we looked down to the varied ice sculpture of Central Spitsbergen. The soft light of midnight enhanced the panorama, and appeared to diffuse on a sea moulded of ivory, whilst the long shadows rested on wax: ice-cliffs cresting the rock faces alone stood out with a metallic lustre in high relief. Towards the west low fleecy clouds hung idly across the Central Plateau, or lapped the passes to Wijde Bay. Yet, somewhat grotesquely, our main enthusiasm centred on the more unlovely components of the scene—the toad-like granite nunatakkr squatting isolated and insignificant some 10 miles away at the head of the "vallée blanche," and other more distant landmarks familiar from the 1921 survey.

Mt. Newton (5445 feet) is commonly accepted as the loftiest peak of Spitsbergen, but serious rivals will certainly be found in the mountainous group to the north-west. Throughout, the heights quoted have been reduced from systematic aneroid observations, and they are probably correct to within 50 feet. Two check points were obtained inland with the Russo-Swedish survey. At the Chernishev station our own figure is 3 feet too high—a happy coincidence. At Mt. Newton the discrepancy is 40 feet. On existing maps the latter summit is credited with some 300 superfluous feet of altitude.

We reached the foot of Mt. Chernishev on August 21, after a two days' blizzard, and a picturesque journey across high passes and steep-walled basins on the eastern flank of Mt. Newton. The intermediate camp lay at the foot of a granite citadel 400 feet high, strictly vertical and commanding the head of the steep-walled eastern glacier from Mt. Newton (see p. 197); this glacier was followed by Odell for some 7 miles, and shown to emerge into a broad white valley, which eventually connects with the Merton glacier.

The pilgrimage to the Russian Station on Mt. Chernishev brought

* Possibly Mt. Poincairé.

† Referred to elsewhere as Mt. Irvine (see *Alpine Journal*).

the first direct evidence of earlier visitors. Both the heavily wired cairn and the geodetic mark were intact after twenty-two years of Arctic weathering; occasional provision tins strewn about still retained a degree of polish, their inscriptions readily legible if unintelligible. Under the reversals of varying winds the heavy metal banner had sheared, and only a strip remained fast to the staff. The plate had fallen flat, and on its underside the Russian colours were well preserved; on the exposed side some white still remained, but the blue and red were practically obliterated. The two thermometers were safe in their metal case; the minimum temperature recorded was −38·6° C., relatively high compared with coast temperatures. A close comparison between our own photographs from this station and those of Vassiliev (*Miss. Russe, loc. cit.*) indicates that practically no visible glacial changes have taken place in this area during the interval of twenty-two years. The resemblance indeed extends to the minutest details, so that corresponding pairs of photographs can barely be discriminated.

The beacon (3960 feet) is conspicuous at the end of a long southerly shoulder of Mt. Chernishev (4570 feet), and commands the "vallée blanche." Five major glaciers debouch into the confluence, one entering from the direction of Mt. Newton, one from the east of Mt. Chernishev, another from the central ice plateau, a fourth, the Oxford glacier, appearing from the south-west, and another beyond the Lion Nunatak. From Mt. Chernishev a flat-topped range, bordering the valley, extends eastwards to a notable corner, whose nature was still obscure from 1921 (see *Geog. Journ.*, Nov. 1922, p. 323).

On August 22 we travelled towards this corner, first leaving a heavy sledge-load at the head of the "vallée blanche." After a thaw the journey would prove excessively disagreeable. The predominant gradient is easterly and mild; over large areas the surface drainage is erratic, often abortive, and morasses abound. A keen frost came to our aid, and all day we skated the lightened sledge over miles of frozen sump, until towards midnight we halted against the bank, 2 miles short of the corner. Three hours later, after a miserable climb up crumbling terraces and a ramble over jet and biscuit-coloured summits, we stood above the family of rounded nunatakkr which terminate the range. Here also terminated our serious explorations. From the corner the Merton glacier spread away into the low northern sun, its serrated front glistening 18 miles away against Hinlopen Strait. In the east lay 25 miles of naked ice—the "terre glacée russe"—flushed with a delicate morning glow; and beyond, fairy-like and barely discernible, stood the remote peaks of Hellwald and Edlund.

The scene was indeed a rarity in a land notorious for summer mists. It encouraged us, maybe unduly, to hope for further favours, but our term had ended. On succeeding days, enveloped in a clinging fog, we travelled to the head of the "vallée blanche," and thence by the western

tributary to the edge of Central plateau. Here we remained impotent for five days camped on a coxcomb nunatak.* Between the frequent snowstorms we added a little to the survey, but our main ambitions here remained unfulfilled. On August 28, with thirty-six hours in hand, we steered homewards across the fog-bound ice plateau, until at the crest of the watershed, the rising wind magically dispersed the curtain and carried our sail-spread sledges to the foot of Mt. De Geer. Here during the night it developed to a hurricane, whose efforts to transport the camp down the glacier were only partly frustrated. Subsequently, we collected the scattered articles, and after blunting our crampons on the execrable ice hummocks of the Nordenskiöld glacier, rejoined the sloop early on August 30.

Some general remarks must conclude this curtailed account. The survey work of the expedition was largely photogrammetric, but its final coordination depends upon the precise positions of the northern beacons of the Arc of Meridian survey. Unfortunately the required latitudes and longitudes are not yet available,† and only a provisional map can be presented at the moment. The topographical survey of the sledge party extends with occasional omissions from Duyn Point to the Merton Glacier, and connects satisfactorily with the work of 1921. It embraces the Mt. Newton area, and includes much of the mountainous groups contiguous with the Lomme Bay glacier. With regard to nomenclature the few suggestions made are viewed as provisional, pending further publications from Russia.

Without considerable financial assistance this journey could not have been undertaken. We welcome the opportunity to express to the Society our indebtedness for the Cuthbert Peek Grant, which accorded us both moral and material encouragement. To individual members of this and other societies who contributed towards the cost, we extend our grateful thanks. Special acknowledgment is due to Mr. Reginald Graham for exceptionally generous support.

II. THE CRUISE OF THE *TERNINGEN*

E. R. Relf

The present section deals with the voyage of the *Terningen* subsequent to the landing of the sledge party at Duyn Point on July 30. Attention will more particularly be paid to points affecting the survey; some general information concerning the radio work may also prove of interest.

* Doubtless the "splintered nunatak" examined by Prof. Garwood in 1897. (See 'With Ski and Sledge over Arctic Glaciers,' 1898.)

† The approximate results obtained in 1898 are published in *Bihang Till K. Svensk. Akad. Hand.*, **26**, 1900–1, Afd. 1, No. 4.

FROM NORTH-EASTERN SHOULDER OF MT. NEWTON

Vallée blanche

LOOKING SOUTH-WEST FROM CHERNISHEV BEACON

Wijde Bay Peaks Mt. Irvine Ny Friesland Ice Sheet Lomme Bay Glacier

LOOKING NORTH-WEST FROM MT. HOPE

On August 1, after sailing south in perfect weather, we anchored, owing to heavy pack ahead, for two days near the coast, a little north of Bismarck Strait. The magnificent ice-front of the Merton Glacier lay to the north, separated from Bear Bay by a rocky promontory. On standard maps a large island is shown between Bear Bay and Bismarck Strait, almost contiguous with the coast. There is an island near this position, but it is much smaller than that shown, and is separated from the coast by a much wider channel. Despite misty weather a consider-

The track of the *Terningen* about North-east Land.

able number of photographs and observations were obtained, from which it is hoped to readjust the positions of several islands of the Waiigat Group.

On the evening of August 3 the ice relaxed and two strenuous days were devoted to reaching open water further south, visible from the crows' nest in the direction of Cape Torell. The passage was completed on August 5, with the sacrifice of a propeller blade. At the next anchorage —an islet of Wahlberg Island—we hoped to fit a spare propeller by

beaching the ship at high tide. The tidal rise proved to be only 2 feet, and the attempt was abandoned.

During the night the captain took advantage of an opportunity to proceed southwards, and we awoke to find the vessel in Ulve Bay, on the south coast of North-east Land. Marked changes appear to have taken place in this area since the observations were made which led to the present maps. To the west of the bay the coast is now low tundra, while to the east the low land represented on maps has evidently become absorbed by the ice-cap, which here terminates in an ice-cliff rising to some 50 feet in height. The differences were, indeed, sufficiently startling to justify some suspicion that the captain had mistaken the bay. Mists continued until early on August 8, when the sun appeared, and observations proved that the captain had made no such mistake. Landings were made by various members of the party, and one result of considerable interest was the discovery, by Elton, of carboniferous limestone so far east. Our routine was here agreeably varied by the excitements of a walrus hunt.

On the morning of August 8, ice-blink told unmistakably of heavy pack extending south-west from Cape Mohn. We weighed anchor, and drifted south-west towards Wilhelm Island, with the intention of reaching the Wyche Islands if a break in the pack could be found. It was soon apparent that the open water in the neighbourhood of Ulve Bay was bounded by ice in all directions except towards the north, and that the ice was slowly closing in towards the coast. We were thus forced to retreat, and eventually found our way through very thick mist back to Wahlenberg Bay, which, to our surprise, was now practically free of ice. We anchored off the island at the mouth of the bay, alongside another sloop, and after due exchange of civilities, were invited on board to inspect a live bear cub—*en route* for Hamburg. On the following day we sailed some distance into Wahlenberg Bay, and made a landing. On the return we passed near the very fine ice-cliff of a glacier on the north side of the bay, some 5 miles from the entrance. There are not many places in Wahlenberg Bay from which access is available for sledges to the ice-cap.

Approach to the east coast of North-east Land from the south having proved impracticable, it was now decided to renew the attempt from the north. A passing visit was paid to Lomme Bay—secluded and exquisitely picturesque. From the summit of Cape Fanshawe the full length of Hinlopen Strait was visible, and we noted, with pardonable interest, that our recent anchorage in Ulve Bay was now ice covered, and that the pack was rapidly drifting up the strait. To the south-west, and far inland, the high peaks of the Newton group showed up very clearly. The Lomme Bay glacier was not visible from Cape Fanshawe, nor did we sail far enough into the bay to observe the nature of its termination. Observations and photographs taken from the Russo-

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Swedish primary beacon on Cape Fanshawe should prove of particular value in relation to the inland survey.

We reached North Cape in fairly open water at 4 a.m. on August 13, after a brief and somewhat disappointing landing at Murchison Bay. East of North Cape the views of the Seven Islands and of the coast scenery became particularly impressive. The bays extending between North Cape and Cape Platten, and between the latter and Rep Island (Dove Bay) are reminiscent of Magdalena Bay, but designed on a vastly grander scale. Each presents its sequence of towering rock buttresses and magnificent glaciers. So glassy was the sea that in many of the photographs it is difficult to discriminate between the true scene and its reflection. In the early morning of August 14 we rounded Cape Platten and crossed Dove Bay, often breaking through thin ice forming on the surface. A passage was effected between the two Rep islands, but shortly afterwards a fog developed and we anchored to an ice floe. Later on the mist cleared, and we pushed eastward until we were off Cape Bruun. At this stage the captain, an expert ice pilot, deemed it imprudent either to venture farther east or to remain long in the vicinity. All hope of reaching Cape Leigh Smith was abandoned, and the leader decided to return to the west. Unfortunately the passage between the Rep islands was already blocked. We made out to sea, and, eventually finding clear water, sailed a straight course back to North Cape. A landing was made here, and the discovery of a German tent bag may prove of some significance in connection with the history of the ill-fated Schröder-Stranz Expedition of 1912.

During the whole of this coastal voyage panoramic photographs of the coast were taken whenever the weather was sufficiently clear; and in addition the positions from which they were taken were determined, as accurately as possible, both by astronomical observation and by bearings taken on known points such as the Seven Islands. The coast-line as mapped appears to be substantially correct except to the east of Rep islands, where considerable differences are suspected. Complete analysis of the photographs, which has not yet been made, may cast light upon this point. It was regretted that we could not remain longer in this region, and explore the bays more thoroughly; but much of the detail work must be reserved for some future expedition.

On the evening of August 15 we left the extreme north of this interesting land, and arrived next day in Wijde Bay. Since August 2 the whole journey had been accomplished with but one propeller blade, no opportunity having been found to effect the replacement. In Wijde Bay a tide of $4\frac{1}{2}$ feet was measured, and after considerable discomfort to those directly concerned, the operation of fitting a spare screw was successfully accomplished. The point at which the ship was beached was known to the Captain as Dirkses Bay, but was certainly not the Dirkses Bay shown on our maps, since Welcome Point was visible well out to the

north beyond Grey Hook. The kindly sun appeared, and our latitude was found to be 79° 46′ N., this confirming the position deduced from sights on the above headlands. A subsequent trip down Wijde Bay showed that no more southerly inlet existed, having the promontory characteristic of Dirkses Bay. During the fitting of the propeller an expedition was made to "Salmon Lake," and from a neighbouring summit we observed perhaps a dozen lakes of assorted shapes and sizes, lying between hills rising to anything between 300 and 1000 feet. A very hasty one-day plane-table and photogrammetric survey was made of some 5 square miles of this country. Many of the hills carry small cairns, and it is possible that the area has already been mapped.

From a more distant summit, known to us as Bird Mountain (980 feet) Longstaff observed a notable lake estimated to be 5 miles long by 1 mile broad. His exploration showed that it extended almost to Wijde Bay, into which its waters drained by way of a remarkable canyon 50 feet deep.

Two members of the party, Elton and Brown, camped in Dirkses Bay while the ship proceeded south to Cape Petermann. Landings were made opposite the Cape, and at Fork Valley, both on the western side of the bay. The coast here is of no exceptional interest. The hill contours are well rounded, the valleys suggesting herds of reindeer, although only one animal was seen. On the eastern shore of the bay three glaciers end in fine ice-cliffs; and the view of Cape Petermann from some distance up the bay is magnificent.

On August 21st we left Wijde Bay and entered Liefde Bay, where four days were spent. Four members camped on Reindeer Peninsula intent on flora and fauna, the sloop meanwhile visiting the picturesque south-western extremity of the bay. Jakobsen's Bay was also entered, and here the sloop ran aground immediately after the mate had dropped the lead and called "No bottom"! The sea bed shelves very gradually from the land, and then drops abruptly to a considerable depth. Fortunately the tide was not at its highest, and we kedged off as it rose, none the worse for the adventure. On August 25 we left Liefde Bay, and after brief sojourns at more familiar ports of call, repaired to Klaas Billen Bay to await the return of the sledge party.

With regard to the surveying work carried out from the sloop, it is as yet too early to say what new information will be forthcoming. In many areas the reduction of results depends upon the preliminary calculation of the coordinates of the geodetic beacons of the Russo-Swedish Arc of Meridian Survey. A few remarks may however be made upon the magnetic observations. When the theodolite was set up at Duyn Point to determine an azimuth necessary to the sledging party for their survey, it was noted that the magnetic variation was different from that expected. Variation was subsequently determined whenever possible, often without a theodolite, by observation of the low

COAST OF NORTH-EAST LAND EASTWARDS FROM NORTH CAPE (ON RIGHT)

COAST EASTWARDS FROM CAPE PLATTEN (ON RIGHT)

DOVE BAY

sun through the sights of an alidade. The accuracy so obtainable was estimated to be about 10′, and was sufficient for the purpose of the observations. The results obtained are tabulated below and indicate a mean increase of 1° 38′ from the values of the 1913 Admiralty Chart, whereas that chart prophesies a decrease of 1° 50′ between 1913 and 1923. The total discrepancy is thus 3° 28′, and is noteworthy.

	Variation W.	1913 *Map.*	*Difference.*
	° ′	° ′	° ′
Duyn Point	7 47	5 30	2 17
Wahlenberg Bay	5 37	4 25	1 12
C. Fanshawe	7 53	5 48	2 5
North Cape	7 1	4 38	2 23
Dirkses Bay	8 33	7 41	0 52
Liefde Bay (S.E.)	1 45	9 42	2 3
Reindeer Peninsula (S.)	11 15	9 4	2 11
Jakobsen's Bay	9 47	8 41	1 6
Magdalena Bay	11 29	10 58	0 31
		Mean	1 38

The variation of differences is not surprising, since the observations were taken at various times of day and the diurnal variation is known to be considerable.

A few words should be said with regard to the use of the Radio equipment during the expedition, since future expeditions will doubtless rely more and more upon this flexible means of communication. The equipment was of low power, the transmitter being a standard Mark II. set as made by Messrs. Burndept, Ltd., for amateur use in this country. It is rated at 10 watts, but was used at between 20 and 25 watts. Both telephony and continuous wave Morse transmission were possible.

The receiving set used on the sledge was designed to fit conveniently into a standard food box. Its total weight, with complete aerial and earthing equipment, was about 25 lbs., but more than half this weight was in the batteries, which had to be of sufficient capacity for the whole month's work. Even this battery weight was only obtained by using the then new D.E.R. valves of Marconi-Osram make, which operated at 0·4 amp from a 2-volt cell. In future expeditions, battery weight could perhaps be reduced to about a quarter of our figure by making use of the latest types of dull-emitter valves, though it is doubtful whether those of very low filament current (0·06 amp) would be sufficiently robust for sledge transport. The receiver contained three valves, and two spares were taken, all being packed for transport in cotton-wool and carried on the sledge. None broke until the last day, when the ice hummocks of the Nordenskiöld Glacier caused two to lose their filaments. The aerial used consisted of a single 7/22 stranded copper wire 80 feet long, supported on bamboo poles 20 feet high at one end and 6 feet at the other, with the lead-in at the higher end. A single

18 s.w.b. copper wire laid along the ground under the aerial served as an "earth."

Transmissions were made at fixed times both by Morse code and telephony. The telephony was not readable, owing to insufficient power, but the Morse was well received, even at 80 miles range. A future expedition with 100 watts or more on the ship could be certain of communication with a sledge party, using a receiver such as ours, anywhere in Spitsbergen. Communication from sledge party to sloop was discussed, but considered impracticable for the present expedition. Weight is the deciding factor, and it is believed that with careful design and the use of a hand-driven generator it would be possible to evolve a satisfactory transmitter weighing about the same as the receiving set used on the present expedition.

The sloop carried a four-valve Burndept receiver, to which an additional valve was added during the journey. The high-power European stations were easily received, and in particular the International Time Signals from the Eiffel Tower and from Nauen enabled us to check our chronometers daily. The advantage of this from the point of view of astronomical observation was incalculable. Attempts to receive the British Broadcast were often made, but failed until our last two evenings in Spitsbergen. On these days the sun set at about 10.45 G.M.T., and immediately the carrier waves of the Broadcast stations became audible. Soon after, music and speech from Newcastle were clearly heard. There is no doubt that in the complete darkness of the winter months the Broadcast stations could be easily received with a three-valve set. General conditions for radio work seem to be perfect in the Arctic. No atmospheric disturbances were noticeable, except on rare occasions.

It should be here noted that certain reports in the press, which purported to have been sent by our wireless, did not emanate from us at all. The installation was used solely for communication with the sledge party. Several attempts were made to get into touch with Green Harbour, but we afterwards learned that they were unsuccessful. It appears that our wave-length (440 metres) was too low to be received effectively on the large aerial at that station.

Before the paper the PRESIDENT (the EARL OF RONALDSHAY) said: The Fellows of this Society will remember an interesting account, given us two years ago, of the work of the Oxford University Expedition to Spitsbergen. Our lecturer this evening, Mr. Frazer, was a member of that expedition and gave his account of its work. Mr. Frazer is, I believe, a Cambridge man, and as a Cambridge man myself I can, of course, quite understand the necessity under which Oxford found themselves of enlisting a Cambridge man as member of their expedition. That was in the year 1921. In the year 1923 a further expedition to the same country took place, which was now known as the Merton College (Oxford) Expedition. Needless to say, Mr. Frazer also took part in that expedition, and to-night he is going to describe to us the experiences of

the sledging party. We have another lecturer this evening in Mr. Relf, who was also a member of the expedition, and his main interest, I understand, was in wireless. He remained, therefore, with the sloop which took one part of the expedition round the coast, and at the same time kept in communication with the sledging party which was crossing the interior. Mr. Relf transmitted messages to the sledging party, but the sledging party, though they were able to receive messages, were unable to transmit them. Mr. Relf therefore continued to transmit his messages on trust. While the expedition about which we are to hear to-night may really be described as the second chapter in the story of this particular piece of exploration, a third chapter is very shortly to be opened, for Mr. Frazer and his friends are embarking in a fortnight's time, or less, upon yet a third expedition to the same part of the world, their intention on this occasion being to make a thorough survey of North-east Land. They have already had excellent experience of this northern part of Europe, and we shall, I am sure, all listen with the greatest interest to the stories which Mr. Frazer and Mr. Relf will be able to tell us this evening. I now ask Mr. Frazer if he will describe to us the experiences of the sledging party.

Mr. Frazer and Mr. Relf then read the papers printed above, and a discussion followed.

The PRESIDENT: Mr. Binney, the organizer of the expedition about which you have heard to-night, and of the expedition which is about to start to North-east Land, is present. I will ask him if he would like to speak.

Mr. F. G. BINNEY: In 1921 we made our first effort in Spitsbergen, and went there without any first-hand knowledge of conditions. I think, if I may say so as a member of the expedition and in no spirit of criticism, we tried to deal with too many branches of scientific work on an equal footing. In 1923 we decided to devote our main effort to geographical work, and we decided that ornithology, botany, and the other sciences should be undertaken after all consideration had been given to new exploration.

I rather gather that people consider Spitsbergen and North-east Land very cold and unattractive places. That is quite untrue, because given reasonable weather conditions, such as we had last year, when we were certainly well favoured, I can imagine no place where one can see the serenity of nature so undisturbed (except on the west coast) by civilization.

In 1921 all the members of the expedition except myself were scientific men, and various learned societies were good enough to present us with funds in order that we might undertake scientific work. That enabled the expedition to go, and we were duly thankful for it, but it meant that we had to guarantee to undertake certain work. Last year we decided to raise the money amongst ourselves, and consequently we were free to take advantage of good ice conditions, if we had them, and to go further afield. In 1921 the ice conditions had been good, but we had undertaken to do a good deal which necessitated our being on the west coast of Spitsbergen. Consequently we were unable to get to North-east Land. Last year, however, we were not shackled by any obligations, and were as a consequence able to make North-east Land, although I admit that the scientific results obtained there were negative. Before we went, however, we realized that this would be so, because the flora and fauna which flourish on the west and north coasts of Spitsbergen are unlikely to flourish in North-east Land, where the ice conditions of latitude 80° are the ordinary ice conditions one would expect there, as that part of the Archipelago

is not favoured by the warm current of the Atlantic Ocean which strikes the west coast of Spitsbergen.

Mr. Relf referred to our hunters, and I would like to add one word on the subject. In order to raise the money we asked a few friends to go with us and hunt, if there was any hunting to do; but the strange thing was that when we got to our destination and it was a question whether we should desert North-east Land and Spitsbergen to look for bears, they unanimously decided that it was better to go on and try to do exploration. The expedition which we are taking out this year, and which we have more or less financed ourselves, is going on the same system. A certain number of them are only amateurs in exploration, but under the guidance of good surveyors they are going up to Spitsbergen. They say they want to shoot bears, but I know perfectly well, when we get to North-east Land and the job is in front of us, that they will be far keener to help with the work of surveying North-east Land, partly from the air and partly by sledging parties, than they will be to shoot a bear, which is like shooting an old milch cow!

There is only one other point. Our two sledgers from Merton—Irvine and Milling—were Oxford rowing Blues, and were taken because it was realized that if they could row from Putney to Mortlake they might be able to get across from one side of Spitsbergen to the other. That was an experiment which was fully justified.

There is only one regret in connection with the last expedition, namely, that when we got to Klaas Billen Bay and were waiting for the sledging party to arrive at the *rendezvous*, we had not a tin of peaches with us. We were rather anxious, because the arrangement was that they should appear at 12 o'clock at midnight at the latest on September 1. We had not seen them all day, but at 9 o'clock our look-out man spied them far up on the Nordenskiöld glacier. We met them about 5 miles up the glacier, and the one thing they really wanted was a tin of peaches. We had only taken chocolate!

The PRESIDENT: Before we conclude I will ask a member of the Council, Mr. J. M. Wordie, who knows these parts of the world, if he will add a word.

Mr. J. M. WORDIE: It is getting late, and there is not time to say much beyond congratulating Mr. Binney on the very successful expedition which he made last season. I think that to-night, rather than look back on last year's work, many will wish to give Mr. Binney a good send-off on the new expedition which he is taking this summer in order to map the whole of North-east Land, and to do it in a most novel way by flying round it in a seaplane. I hope, therefore, you will join with me in wishing his party every success on their new venture.

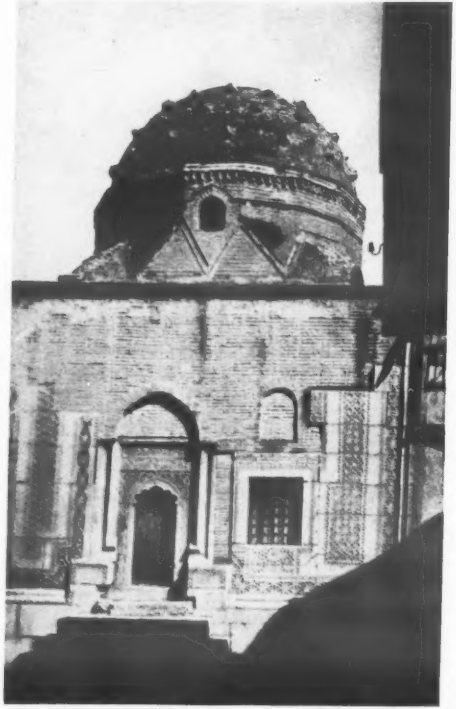
The PRESIDENT: I am quite certain that you will join with Mr. Wordie in wishing Mr. Binney and his colleagues every success on the expedition which they are about to undertake. The Council of your Society have no doubt whatever as to the value of the work which they are likely to do, in spite of the fact that they may have with them some of those persons whom Mr. Relf described as large or big-game shooters. Your Council are so satisfied with the results of the two previous expeditions that now that the Society's financial position is beginning to show some improvement after the difficulties experienced owing to the war, we have decided to make a grant towards some of the equipment which Mr. Binney and his friends require to enable them satisfactorily to carry out the work which they have in view. We have all, I am sure, enjoyed enormously the description, and particularly the excellent photographs which have been placed before us this evening, and we shall look

THE CITADEL OF ANGORA: FROM THE WEST

ANGORA: PART OF THE CITADEL

ANGORA: THE TRIPLE WALLS AND BURNT-OUT CHRISTIAN QUARTER

KONIA: THE INJE MINARELI MOSQUE, USED AS AMMUNITION STORE



KONIA: A SELJUK TURBE

THE CILICIAN GATES

forward in due course to hearing an account of the survey of North-east Land which is about to be undertaken. I venture to offer to the lecturers, on your behalf, your most sincere gratitude to them for their lectures this evening.

A JOURNEY IN ANATOLIA

Lieut.-Col. J. H. M. Cornwall, C.B.E., D.S.O.

HAVING spent four years in Constantinople with the British Army of Occupation, and a further four months there in studying Turkish, I determined to vary the last six weeks of my language leave by travelling in Anatolia. The object of my journey was threefold: to study the communications of the country and the means of transport available; to visit as many as possible of its antiquities and places of interest; and to observe with my own eyes how the new Turkey, after fifteen years of revolution, war, and evolution, is settling down to peace conditions without the assistance of her expelled Christian population.

The time of my projected journey was not altogether propitious. The season (beginning of April) was early for camping out on the high wind-swept plateau of Central Asia Minor; but still less favourable was the unsettled political condition of the country. Seventeen months before the Sultan had quitted Constantinople hurriedly in a British warship and had been publicly deprived of his authority by the National Assembly; six months before the Allied Forces had evacuated Constantinople and the Straits, although the Lausanne Treaty had not yet been ratified in London; a few weeks previously the last Caliph (himself elected by the Grand National Assembly) had been unceremoniously ejected from Turkey together with all his family. Lastly, the Turkish Government had just completed the demobilization of its army, had only recently mastered a serious outbreak of brigandage all over the country, and was in the throes of the exchange of its Christian population with the Moslems of Greece, one of the most difficult political experiments which has ever been tried. Had I not, during a visit to Angora three months previously, established friendly personal relations with Ismet Pasha and some of the leading deputies of the National Assembly, I doubt if my journey would have been possible at all.

Our party consisted of four persons, my wife, myself, our cook Hussein, and a Turkish companion, Feridun Bey. The latter's duties were twofold: firstly, to coach me in the language, and secondly, to dissipate suspicion and possible obstruction on the part of local officials. Any one who has travelled in Turkey knows how maddeningly dense and obstructive local officials can be! We took with us tents and equipment, a small stock of reserve rations, and our saddles. Our kit weighed in all 7 cwts., and we could not well have done with less. We did not

THE CILICIAN GATES

KONIA: A SELJUK TURBE

KONIA: THE INJE MINARELI MOSQUE, USED AS AMMUNITION STORE

take horses, as we had decided to test the available means of transport we might find locally, including the railway.

Having been amply warned of the folly of our enterprise by our friends in Constantinople, we determined to live up to the part by starting from Constantinople on the morning of April 1. A five-hour journey across the Marmora in a little tub of a steamer brought us to Mudania, the scene of General Sir Charles Harington's peaceful victory in October 1922, and thence a tiny toy train took us at a leisurely pace through olive gardens and orchards of peach, plum, and almond up to Brusa, the early capital of the Osmanli Sultans.

Brusa was outwardly little changed since I had visited it two years previously while it was in Greek occupation. But all its industrious Greek population had gone, eighty per cent. of its mulberry trees had been cut down for firewood, and its famous silk industry is practically extinct. Brusa is renowned for its hot mineral springs, its old mosques and the tombs of the early Sultans, and also for its fine situation at the foot of the Mysian Olympus, overlooking a wide green plain; but European visitors will perhaps remember it first in connection with Madame Brott, the old Frenchwoman who keeps the *Hotel d'Anatolie*, and who has done so for the past sixty-two years. She is an old woman now, eighty-four years old, and has seen better times. Madame Brott's hotel was our last link with European civilization, for from it we set out on our real trek.

The normal method of conveyance in Anatolia is the *araba*, a four-wheeled cart of rough construction, usually drawn by two horses. There are two varieties, the *yaili*, or spring cart for passengers, and the *yuk árabasi*, or springless baggage waggon for luggage or merchandise. The *yaili* accommodates five at a pinch, or three in comparative comfort, besides the driver; the *yuk árabasi* carries a maximum load of about 16 cwts. Both are covered with a tilt, usually of waterproof material, that of the *yaili* having openings at the side, which can be closed by curtains. The horses are of the local country-bred "light vanner" type. They are shod with whole plates, instead of with shoes of European pattern. The drivers, or arabajis, as a rule treat their horses kindly and considerately, and attend carefully to their watering and feeding. They give them a very large ration—25 lbs. of barley and 8 lbs. of chopped straw. The cost of hiring a two-horsed araba is not fixed—one has to do a lot of strenuous bargaining on each occasion, but the daily tariff should be somewhere between twelve and twenty shillings, varying with the price of barley in different districts. The arabajis reckon on a nine-hour day, including an hour for the midday feed and rest. Distances in Anatolia are reckoned not in miles or kilometres but in hours. The roads vary considerably in their suitability for wheeled traffic. Our average pace during twenty-two days' march in an araba worked out at $3\frac{3}{4}$ miles per hour, so that one ought to be able to reckon on an average

daily stage of 25 to 30 miles. Our maximum was 36 miles in eight and a quarter hours' actual marching, but that was on an exceptionally good road, the first and the best we struck.

Our first introduction to the roads of Anatolia was indeed a pleasant surprise, but somewhat misleading in the light of further experience. Our first objective was to reach the Anatolian railway at Qara Köi station, 100 kilometres east of Brusa. Two years ago this road was the main line of communication for the Greek Northern Army group, based on Mudania and Brusa. During their occupation the Greeks had converted it into a first-class motor road, having obtained the funds for the purpose by exacting a toll of $1\frac{1}{2}$ livas from every araba using the road. It is a significant fact that the only roads in Anatolia to-day fit for motor traffic in wet weather are those constructed by Turkey's enemies during their periods of military occupation—by the Greeks in the west and by the Russians in the north-west. Even these blessings conferred by the war, however, will soon be swallowed up in the mud and sloth of Turkey.

The accommodation afforded by Anatolia to the traveller is almost as indifferent as its means of communication, and although much genuine hospitality is met with, it is advisable to be independent and take one's own tents. Nowadays this precaution is more than ever desirable, as the villages have been completely destroyed by the ravages of war in many districts, while in others the influx of Moslem *muhajirs* from Greece has rendered the housing problem acute. In any case, a tent is infinitely preferable to the insect-ridden khan, or village guest-house, although our Turkish retainers by no means shared our opinion on this point, and were always endorsing the military maxim that "the worst billet is better than the best camp."

Two days' trek on the good Greek high-road brought us to the railway, along which one passenger train runs daily in each direction between Haidar Pasha and Angora. Our destination however was the Baghdad Railway, for which one gets a connection four times a week at Eskishehr, Anatolia's most important junction. Travelling on the Anatolian Railway is not to be recommended for pleasure. The trains are few and badly organized; the carriages are crowded with both human beings and their parasites, and the purchase of a first-class ticket does not necessarily ensure that you obtain any accommodation at all.

Afiun Qarahisar is one of the least attractive of the towns of the Anatolian plateau. Contrasted with the mild air and blossoming orchards of Brusa, it appeared to us doubly forbidding on the cold, raw, wintry morning which saw us landed there. However, it was to be the doorway to one of the most attractive parts of our journey, our visit to the Phrygian Monument country. Having hired three indifferent ponies, and an araba to carry our kit, we trekked northwards over a bleak

windy plain for 20 miles and pitched our tents at the little village of Ayaz Ini, under steep cliffs honeycombed with the tombs and cave-dwellings of former civilizations. That same evening we were standing before one of the earliest known of the Phrygian Monuments, the "Lion Stone," carved on a rock-face in a rugged wilderness of stone and scrub by men of a little-known race some three thousand years ago.

The next morning we rode up into the Phrygian hills and down a lovely little glen; for miles we followed a brook that splashed its way between primrose-covered banks under pine-clad hillsides. It might have been Scotland, or Norway, or Switzerland; certainly it seemed very pleasantly far away from Afiun Qarahisar. The Turk is not imbued with much sense of the beautiful, or appreciation of nature. I asked our escorting gendarme what he called a primrose: "*Chichek dir*" ("it is a flower") was his answer. "Yes, but what flower?" we asked. "*Sari bir chichek*" ("a yellow flower") was all the answer we got, and he was a native of Brusa too. We had a long and strenuous ride through sparsely inhabited woodland to see the famous Midas Tomb, one of the later Phrygian Monuments, but were almost more interested to discover in the pine forest traces of the earliest known road in Anatolia, the old Royal Road, which ran eastwards from the Ægean Sea to the old Hittite capital in Cappadocia. This road is thousands of years old, and in places the wheel-ruts are worn down 16 inches into the solid rock. That night we got back to camp two hours after sunset, after a 40-mile ride, tired and hungry. Not so tired or hungry, however, as our Phrygian guide Ali, who had done the journey on foot, and, as it was Ramazan, without bite or sup or smoke since sunrise.

From Afiun Qarahisar an eight hours' train journey brought us to Konia, the headquarters of the Dancing Dervishes and the seat of the Seljuk Sultans, who lorded it over most of Anatolia before they passed it on to their Osmanli cousins. Konia resembles nothing so much as a tombstone of Turkish sovereignty, a decaying collection of mud hovels interspersed with a few crumbling gems of Seljuk decorative art.

After another six hours of the Baghdad Railway we reached Eregli, our starting-point for an expedition to the Taurus. To the traveller journeying from the dreary wastes of the central plateau, the glittering snow peaks and picturesque gorges of the Taurus come as a refreshing change of scene. On the morning after our arrival at Eregli, we plunged into one of the little ravines cut into the granite mass of the Bulghar Dagh, 10,000 to 12,000 feet high. Our road turned into a winding lane, bordered with poplars, walnuts, and fruit trees, and ended in a narrow cleft in the rock concealing the village of Ivriz, perched above a small trout stream and embowered in masses of cherry blossom. The source of the stream we found just beside the village. It bubbles straight out of the rocky river-bed and flows on full-grown as if bestowed on the locality by a beneficent Nature-god. So at least the phenomenon

must have presented itself to the earliest known inhabitants of the valley some four thousand years ago, for on the rock-face above stands carved in intricate detail and almost perfect preservation a bold outline of the God himself bestowing corn and grape-bunches on the representative of a grateful people. This was the most interesting of the Hittite rock sculptures which we came across during our wanderings, and it was rendered doubly attractive by its delightful setting and the appositeness of the allegory which inspired it.

The next evening saw us at Ulu Qishla, a wretched village of mud hovels, but a fairly important communication-centre, for from here the post-road leaves the Baghdad Railway and runs northwards to Nigde, Qaisariya, and Sivas. Ulu Qishla is about 5000 feet above sea-level, near the highest point of the Baghdad Railway, and at night was bitterly cold. It was crowded with Moslem immigrants, great raw bony men from Kozana in Epirus, who were being despatched by road from this point on the railway to replace the expelled Greeks of the Nigde and Qaisariya vilayets. We pushed on next day by road to visit the historic pass of the Cilician Gates, having found it impossible to see the Taurus tunnels as the train traversed them in both directions by night. That evening we pitched our camp at Bozanti Khan, where the road and railway diverge, the latter plunging into the limestone massif, several miles to the east of the river gorge followed by the old highway.

The next morning we rode up over the Tekir Beli pass and down through that narrow defile which has witnessed the passage of so many armies. The Roman Emperor Marcus Aurelius has left an inscription on one side of the pass, and the 92nd Punjabis, who marched through in 1919, on the other. The scenery is magnificent, the steep mountain sides being covered with stately pines, while wild flowers peeped out everywhere from the crevices in the grey limestone cliffs. We rode on south for another two hours through that frowning gorge till we emerged on the sun-clad slopes of Cham Alan overlooking the Cilician Plain. Cham Alan (" the clearing in the pines ") was a big German hospital base and mechanical transport park during the war, and they could not have chosen a more ideal spot. It must have spelled heaven for the wounded from 'Iraq and Palestine to recuperate in that clear mountain air, with running water and green pine forest and blossoming fruit trees and aloes.

Another grand day in the Taurus was our ride up to Bulghar Maden. We had pitched our tents the evening before by moonlight in a deserted orchard beside a murmuring river, and the night for once in a way had been mild and balmy. Having collected ponies from a neighbouring village, we rode for three and a half hours up a narrow valley overtowered by the snowy peaks of the Bulghar Dagh, the main range of the Taurus. The sides of the valley were covered with vineyards, and its floor was packed with cherry orchards in full bloom, interspersed with

apple, pear, peach, plum, and apricot. The previous day I had come round a corner suddenly on an eagle which had just struck and killed a fine plump partridge; he had made off hurriedly with the partridge in his talons, but a stone quickly hurled made him drop it, and the bird was promptly plucked by Hussein and put in the pot. So when we reached the village of Bulghar Maden we had cold partridge for lunch, although it was April 20! Bulghar Maden was once Turkey's richest silver-mine, but the miners were Ottoman Greeks, and they now sit listlessly idle, waiting for the order to pack up and go to Greece. The smelting furnaces are crumbling or in ruins, and it is unlikely that the Turk will ever be able to make the mine pay again unless he invites the co-operation of foreign energy and skill.

The ride to Bulghar Maden closed another chapter in our Anabasis; the following morning we packed our four selves and our 7 cwts. of kit into a Ford lorry and set out from Ulu Qishla on a two days' journey northward to Qaisariya. The road had been entirely reconstructed during the war under German supervision, though now rapidly deteriorating through neglect. However, to the credit of the road and our vehicle, be it said that we accomplished the whole 200 kilometres without a single puncture or mishap at an average speed of $17\frac{1}{2}$ kilometres an hour.

Our road ran northward over a dreary, treeless, sparsely inhabited steppe country, with fine views of distant volcanic peaks covered with snow, the Hasan Dagh and the range of the Ala Dagh. But though the country now suffers from the Turkish blight, it was not always so, and still preserves interesting relics of its past. Three hours brought us to Nigde, with the finely sculptured doorways and arches of its Seljuk mosques and *medresses*, and a beautifully proportioned and carved stone *turbe* or mausoleum of the same period, the finest of its kind in all Anatolia.

Beyond Nigde we left the high-road and crossed a flat featureless plain to a mud-built village called Hasa Köi, two hours further north. Externally Hasa Köi appears devoid of interest, but descend into the cellar of any one of its mud houses and you find yourself in a labyrinth of subterranean dwellings, stables, storehouses, and churches, carved in the solid rock by the Troglodyte inhabitants of Cappadocia, no one can tell how many thousands of years ago. Thanks to their independent spirit and their underground refuges, these sturdy Cappadocians have preserved their early faith and speech and race in the very heart of Moslem Anatolia. But their hour has now struck, and they are due to quit their old homes for ever this summer and make a fresh start in Greek Macedonia.

The following day a walk of two hours under a hot sun took us to a little-frequented valley, the Soghanli Dere, another centre of the old Cappadocian cave-dwellers. The narrow glen is enclosed by pre-

cipitous cliffs of soft volcanic rock, which are honeycombed with hundreds of caves, churches, dwellings, pigeon-lofts, and tombs, which formed a safe retreat for the early Christians of Asia Minor.

From Qaisariya, a commercial centre of little interest, northward to Yozgad, we had three long days of dull trekking across the rolling treeless plateau of Central Anatolia. It is a country of vast emptiness and distant horizons; fertile enough and full of fruit trees where a stream from the distant mountains offers a chance of irrigation, but for the most part inhabited only by sand grouse, partridges, bustards, and birds of prey.

At Yozgad, somewhat to our surprise and embarrassment, we encountered a sort of royal welcome. We were received most kindly by the Vali and the Mayor, and lodged and entertained as guests in the Town Hall. Until this year Anatolia was divided into about fifteen large vilayets, each governed by a Vali. The vilayet in its turn was subdivided into three or four sanjaks each administered by a mutessarif, who received his orders from the Vali. This year, however, the administrative system has been altered; every sanhal has been converted into a vilayet, and every mutessarif into a Vali, each of whom takes his orders direct from Angora. This, of course, has resulted in tremendous centralization of authority, and very little initiative or responsibility is allowed to or assumed by the local officials. The Vali of Yozgad, however, we found to be an exception to the general rule, and was full of energy and ideas. Indeed, the moment we entered his district we had remarked on the unusual activity being displayed in the repair of roads and bridges.

From Yozgad it is a day's ride to Boghaz Köi, the oldest city in Asia Minor. From this mountainous fortress the Hittite sovereigns four thousand years ago must have ruled an empire which extended from the Ægean to the confines of Assyria and Egypt. The labours of the German excavators just before the war have revealed many interesting details of this ancient capital. Few fortresses have been better sited as regards natural strength, while the labour extended on its artificial defences can be judged from the fact that a tunnel 80 yards long pierces the foundations of one of its outer ramparts. The modern village remains on the fringe of the ancient city, on a hillside overlooking a fertile well-watered plain stretching to the north. The inhabitants are so prosperous that here, alone in Anatolia, they will not accept the paper money universally used in Turkey since the war, but insist on payment in silver. Luckily, the hospitality of the Turkish "Lord of the Manor," a descendant of the family which has held sway here since the first days of the Turkish conquest, saved us from the necessity of bargaining for supplies. Some 20 miles north of Boghaz Köi, at the village of Euyuk, were once some more interesting Hittite sculptures, but on arriving there we were disappointed to find that most of them had been carved up and transported to Angora.

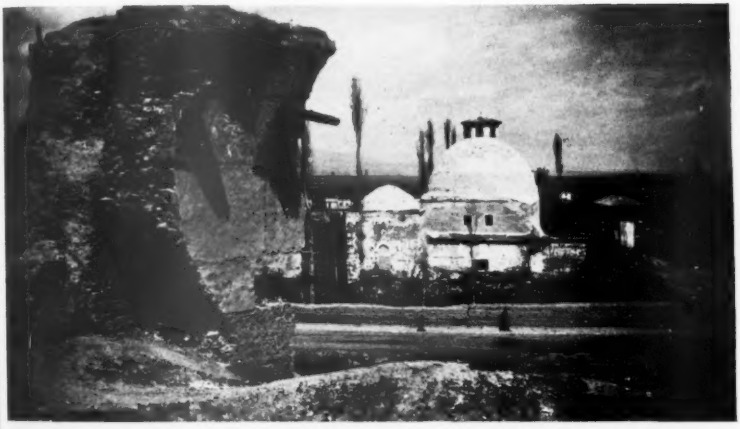
Another three days' trek in our araba brought us to Amasia, reputed justly enough to be the most picturesque town of Asia Minor. It stands on both banks of the swift Yeshil Irmaq, which flows here between precipitous cliffs 800 or 900 feet high, in which are hewn the rock tombs of the old Kings of Pontus. The alteration in the temperature of the atmosphere and the fertility of the soil is very marked as one drops into this valley of luxuriant green from the comparatively arid plateau. Vines, mulberries, and all kinds of fruit and vegetable grow in profusion. At Amasia we had to endure the guns and drums and other noises with which the Turks herald the first day of Bairam. Notwithstanding the festival, and goaded to take the road again by the disturbing effects of the insects in our " hotel," we pushed on northwards in depressing rainy weather.

The Amasia–Samsun road is one of the most frequented and commercially important highways of Anatolia. Along it we met and passed a constant stream of caravans, camel, mule, pack-horse and donkey, and yet without exaggeration it was the worst road we struck on the whole of our journey. For four days our araba floundered and jolted up and down its steep gradients, and we expected almost every minute of the journey to be left bogged in a slough of mud and boulders. The country between Amasia and the Black Sea differs very considerably both in features and in climate from the dreary, treeless steppes of the central plateau. The rainfall is plentiful, the soil is rich and well cultivated, and the successive mountain ridges are clothed with scrub and the scanty remnants of former forests. The landscape is varied with hedgerows, woods, and orchards, and in general resembles the scenery of Scotland or Wales.

Finally we looked down from one of these green ridges and saw the Black Sea stretching beneath us. We were pulled up short by our arabáji jumping off his box and demanding a bakshish before he would go a yard further. This is an old custom in Anatolia, and I had a liva ready for the occasion.

From Samsun a French steamer conveyed us in three days back to Constantinople, stopping *en route* first at Ineboli, whence a motor road leads up through masses of wild rhododendron and azalea to Angora. We spent the next day at Zunguldak, the main port for Anatolia's only coalfield. The coal-seams are close to the surface of the ground and also near the coast, so that with proper management the area should be a considerable source of wealth to the country. Before the war the mines and the railway connecting them with the port were opened up and managed entirely by foreigners or Ottoman Greeks. Efficient methods were employed and the output was about 700,000 tons a year. Now the Turks have evicted the Greeks, have confiscated the railway from the French company, and are gradually making it impossible for the foreign element to carry on. The production is perhaps one-third

THE ROYAL ROAD TO BOGHAZ KÖI



KONIA: PALACE OF ALA-ED-DIN AND THE KARATAI MEDRESSE

ŞOGHANLI DERE: TROGLODYTE DWELLINGS IN VOLCANIC CONES

THE MIRROR TOMB AT AMASIA

THE MIDAS TOMB

THREE-STOREYED ROCK DWELLING WITH INTERIOR STAIRCASE, SOGHANLI DERE

of what it was before, and cannot increase under the present régime. This is typical of what is going on all over Turkey.

I cannot conclude my story without recording my impressions of the way in which the exchange of populations is being carried out. The Turk has been callous in his handling of this problem. To be fair to him one must, however, admit that his treatment of his own co-religionists arriving from Crete and Macedonia has been almost as heartless as that which he accorded to the outgoing Christian population. Although the agreement between the Turkish and Greek Governments regarding this exchange was signed on 30 January 1923, thus giving ample time to make suitable preparations, practically nothing was done. When we travelled through Anatolia sixteen months later the exchange was in full swing, but, owing to the almost entire lack of any provision having been made either by the central Government or local officials, the incoming refugees were exposed to many hardships and miseries. The Moslem immigrants were arriving by hundreds at Turkish ports, whence they were packed by the dozen, men, women and children, into open carts and sent hundreds of miles over vile roads into the interior. Arrived at their destination, they were told off to the houses or hovels abandoned by the Christian emigrants, in many cases eighteen months before. We saw streets of these "abandoned properties" in Afiun Qarahisar, Konia, Qaisariya, and Samsun; naturally enough, many of the houses were mere ruins, having in the interval been despoiled of doors, windows and roofs by their Turkish neighbours. There is little wonder that under such conditions of transport and accommodation the *muhajirs* suffered very considerably, and that many of the ailing and the aged died *en route*.

In the Samsun–Bafra district, where the best Anatolian tobacco is grown, the new-comers will fare best, as the Moslem cultivators from Macedonia can there replace the expelled Christians who produced the famous Samsun brands of tobacco. Here also the crop of both cereals and tobacco should be a bumper one this year owing to the abundant spring rains. But in the other and less favoured districts, on the high sparsely watered plateau, for instance, and in the war-devastated areas of the west, the prospects of the *muhajirs* are far from rosy. They are in the main tillers of the soil, but they have come to an unprogressive country, where little incentive is given to increase the productivity of the land. The expelled Christians whom they have replaced were mostly town-dwellers—shopkeepers and artisans, weavers, cobblers, carpenters, and metal-workers, whose handicrafts they are unable to practise. This indeed is for Turkey the great tragedy of the exchange, a tragedy which she has brought on herself by her own shortsightedness. She has driven out the real wealth of the country, the intelligent, industrious, and thrifty Christian inhabitants, the bulk of whom represented the survivors of the original pre-Turkish population.

THREE-STOREYED ROCK DWELLING WITH INTERIOR STAIRCASE, SOGHANLI DERE

THE MIDAS TOMB

THE MIRROR TOMB AT AMASIA

It was they who packed the figs, wove the carpets, tanned the leather, and dug the minerals which formed the staple articles of Anatolia's export trade. Turkey has committed industrial suicide.

Whatever may be said about the Turk's treatment of his expelled Christian population, whom he regarded as enemies and traitors, nothing can excuse his neglect of the incoming Moslem *muhajirs*. He had ample time and opportunity to provide for them. Last September the British Army handed over to the Turkish Red Crescent Society at Kilia on the Gallipoli Peninsula a well-laid-out hut cantonment, with electric light and water laid on, capable of accommodating an infantry brigade. This would have formed an ideal concentration camp and clearing centre where the refugees could have been housed in cleanliness and comfort until suitable accommodation had been found for them. Far from availing himself of such an obvious and providential advantage, the Turk started to tear down the huts immediately after our evacuation, and in such a way that the timber and corrugated iron sheeting was rendered entirely unfit for reconstruction.

However, the Turk has assumed the task of running his own country in his own way, and few will dispute his right to do so. If he fails he will, in the long run, be himself the chief sufferer. And it must be granted that in many ways he is running his country better than it was ever run before, and that in spite of the enormous difficulties engendered by a succession of wars, a diminished population, and an almost chronic political and constitutional ferment. To take one example: internal order and security are now absolutely assured throughout the country, whereas six months ago it was still being ravaged by bands of deserters and brigands. Religious and racial fanaticism is dead in Turkey, and throughout our journey of 1200 miles across Anatolia we met with unfailing courtesy, candour, and kindness. During our absence of six weeks from Constantinople we never suffered a day's real discomfort, and all were full of interest and pleasure; to any one in search of a new and fascinating experience I can confidently recommend a journey in Anatolia.

THE SNOW MOUNTAINS OF YUNNAN

F. Kingdon Ward

Map follows page 272.

IT seems at first sight rather curious that the earlier travellers in western China should have had so little to say about the snow mountains of Yunnan. The reasons however are simple. Travellers as a rule have chosen the summer months for their journeys through so mountainous a country, when the snow peaks are usually veiled. Since at this season on any given route they may be visible only for a

day or two at a time, unless one is favoured by fortune, it is easy to pass close to a great range without even suspecting its existence. Thus Gill, crossing the Paima La, south of Atuntze, on 9 September 1877, makes no mention of the snowy range on his right only a few miles distant, though on a fine day the peaks and glaciers are very conspicuous. "As for the rain and fog," he writes, "except for five minutes . . . rain fell and fog enveloped us incessantly the whole day" ('The River of Golden Sand,' vol. 2).

There is another reason. Many of the trade routes in the north-west corner of the province, where the snow ranges are situated, are confined for long distances to the deep river gorges. The high ranges for the most part rise abruptly above the rivers, and only an occasional glimpse of the snow peaks is obtained from below. Unless one is spending some time in the country, therefore, the chance of seeing them is remote; at best one is likely to pass on with only a vague idea of their position, height, and extent. So Cooper, in 1868, when travelling from Atuntze to the Mekong, failed to see Kakarpo, which, during the latter half of the descent, fills the mouth of the Atuntze valley, and again becomes visible for a few minutes only further down the Mekong. Similarly, M. Bacot, who visited Gongkaling (Congkaling on his map) in 1909, departed ignorant of the fine snowy range which must almost overlook the monastery. He remarks that on the day he was there the sky was overcast and rain fell—an event so rare at that season as to cause comment. He was particularly unlucky. Not so long ago, as geological time is reckoned, it must have been quite impossible to traverse Yunnan without seeing snow peaks on every hand. One can picture the remarkable spectacle in the north-west, where glaciers crawled down every range to at least as low as 10,000 feet, and in many cases must have entered the Mekong itself. At that time too the rivers must have flowed at a higher level, and it is possible that glaciers reached the Salween, and the Yangtze also. But the ice has steadily retreated till now the snowy ranges are well defined, the snow peaks isolated.

Even so, and despite the attention paid to Yunnan by recent explorers, little is known of the snow mountains of Yunnan. The heights of the great peaks are mere matters of estimation. No one has ever climbed a snow peak in Yunnan—or in Szechwan either. Their positions on the map, when recognized at all, are often wrong, their extent vague.

The standard map of Yunnan is that by General H. R. Davies. On this map however no snow peaks are marked, though several are referred to in Davies' book, 'Yunnan; the Link between India and China.' The relationships of Yunnan and Szechwan to adjacent regions are well shown on the map of Tibet published by the Survey of India; but the 1919 edition does not credit Yunnan with a single snow peak, its compilers evidently being quite blinded by the glitter of the Himalaya. In vindication, therefore, I am tempted to write these notes—a summary

of observations made during journeys undertaken in 1911, 1913–14, and 1921–22—put together in the hope that they may be of use to future explorers and climbers, since western China will certainly attract scientific travellers in larger numbers in the future.

The snow ranges of Yunnan are a prolongation southwards of uplifts which have their origin in Tibet.* They have in the past been regarded as spurs of the Tibetan plateau; a view which, whatever meaning may be attached to the word "spur," is certainly wrong. Some of them at any rate are independent uplifts. These parallel ranges grow lower in the south, and more dissected; so that in Yunnan, the groups of snow peaks are at the ends of well-defined ranges, and are neither so lofty nor so numerous as they are in Tibet itself.

The present snow peaks can hardly be considered apart from the glaciated ranges of which they are the culminating points; and I shall have frequent occasion in the course of this survey to refer to past glaciation. I will begin with the Likiang range, because that is the first snow range likely to be encountered by travellers from the Burma side. Probably it is the most southerly group of snow peaks in Yunnan, though the Tali range, 70 miles to the south, must have been recently glaciated.

The Likiang Range.—The French traveller Gervais-Courtellemont seems to have been the first to notice the Likiang snow peaks, though several travellers must have been in a position to see them, had the conditions been favourable, long before 1898. Following the main road northwards from Tali to Weisi or Likiang, a good view of them is obtained from the head of the Kienchwan valley. An even better view is obtained from the neighbourhood of Yungpeh, in the east, when the whole extent of the southern range is revealed, from the southernmost peak which rises from the head of the Likiang valley, to the gap in the north where the Yangtze cuts its way through.

After the discovery of the great Yangtze loop round Likiang, it was assumed that the snowy range (though not then recognized as such) was responsible for this. The river, so it was asserted, had been turned aside by this obstacle, and forced to flow round its end. Unfortunately for this comfortable theory, the axis of the Likiang range lies north and south, while the Yangtze here flows north-north-east, thus cutting clean across it; the range is in fact continued beyond the Yangtze, which flows through it at the bottom of a profound gorge.

The Likiang range, on Handel-Mazzetti's map published in Vienna in 1919, for the first time receives a definite name—Yülung Shan. He gives the altitude of the main summit (marked "Satseto") as 5900 metres, subsequently reduced to 5815 metres; and in a letter he informs

* I am not here referring to their geological origin. Their underlying axes *may* run east and west; but the traveller sees them as a series of independent ranges trending north and south.

me that this height was obtained by "photogrammetric construction over Lidjiang (Likiang) 3340 metres." It is unlikely that the highest summit is under 19,000 feet, or that it attains 20,000 feet.*

The Likiang range is crossed at its southern end (at Kan-hai-tzu, "dry lake") by the main road to Chungtien, which after crossing the Yangtze follows its western foot. The main road to Yungning, on the other hand, passes through the centre of the Yangtze loop, following the eastern foot of the range and gradually diverging from it. On the first two days the glacier torrents Pai-shui Ho and He-shui Ho are crossed. From Minying, reached on the fourth day, a road crosses the mountains to Taku, on the Yangtze, whence Chungtien may be reached by a road along the eastern foot of the snows.

The big glacier which feeds the Paishui on the east flank of the range has retreated some miles, and is evidently still in retreat; and the same is true of the other glaciers. The lake at Kan-hai-tzu has virtually disappeared, and so has a lake on the east flank, immediately south of the Paishui. A lake at the head of the Likiang valley has shrunk till it is now little more than a marsh; while the valley or plain of Likiang itself is obviously the bed of a former lake. The level strata of gravel and sand on the floor, containing lacustrine shells, prove that. The Likiang range was marked correctly as a snowy range on the map of Tibet and Adjacent Regions published by the Survey of India in 1914. For some curious reason it was removed from the 1919 edition, yet it is some 40 miles in length. Unlike most of the snow peaks of Yunnan, the Likiang range is composed mainly of limestone.

Kakarpo.—Neither Cooper nor Gill mentions these peaks. M. Roux, whom Prince Henry, when at Tzeku, had sent up to Atuntze, sighted "the three snow peaks of Dokar La, with its fine glaciers, on the right bank of the Mekong, and estimated their height at about 17,875 feet" ('From Tonkin to India,' Prince Henry of Orleans). Davies and Ryder saw two of the peaks from the Dong Gorge just north of Atuntze, and calculated them at 20,000 feet by clinometer observation. Handel-Mazzetti on his map marks them "about 6000 metres." Prof. J. W. Gregory, on the other hand, who saw them only from a considerable distance, estimated the highest peak at 24,000 feet. Considering that the rainfall on Kakarpo is probably much heavier than on Paima Shan, it is quite unlikely that the highest peak exceeds 22,000 feet.

The Kakarpo range extends for about 30 miles from north to south between lats. 28° 45′ and 28° 15′, forming part of the Mekong–Salween

* Writing at a distance from libraries, the author seems to be slightly in error in regard to the earliest accounts of the Likiang snows. In describing his journey of 1895 Bonin already spoke of two peaks covered with perpetual snow and probably exceeding 5000 metres, and was aware that the Yangtze passed between them. Gervais-Courtellemont was not there till 1903, and had been preceded in the same year by Litton, who also spoke of the great snowy range.—Ed. *G.J.*

divide. The range is crossed at its southern end by the Dokar La, and at its northern end by the Chu La, each pass being overshadowed by a snow peak. From above Atuntze six snow peaks are revealed, one of which—the southernmost and highest—is itself a triple peak. This type of peak, a central pyramid flanked by two smaller teeth, is common in Yunnan. The central peaks of the range are almost due west of Atuntze, and are well seen from the high peak west of that village. An even better view is obtained from Paima Shan. Again, some of the peaks are visible from the valley of the Yü Chu, and one at least from Trana, just below Menkung, in the Salween valley. Kakarpo, in fact, is a sacred mountain, and one or other of its half-dozen peaks is in view from almost any point on the circuit followed by the pilgrims.

When crossing the Dokar La I glimpsed the big glacier which discharges a torrent into the Salween at Lakorah. But there appears to be no record of the appearance of these glaciers on the western flank, or of the peaks: doubtless owing to the inaccessible nature of the Salween–Irrawaddy divide.

From the Dokar La it is a simple matter to reach the foot of the southernmost glacier and approach the highest peak. Similarly the most northern peak could be climbed from the Chu La.

M. Bacot, when crossing the Dokar La in 1910, caught sight of the glaciers of Kakarpo. He does not, however, call the mountain by that name, but speaks of a saint named Koa Kerbo, who some centuries ago lived (so it is alleged) amidst the desolate snows; hence the name of the mountain, henceforth sacred ('Dans les Marches Tibetaines,' J. Bacot). But Karpo ("dkar po," དཀར་པོ) means "white" and "Ka" ('k'a ཀ) means "snow," a description attached to many otherwise nameless snow peaks in eastern Tibet; for instance, Kangri Karpo. This therefore seems to be the more simple explanation of the name. Like the Likiang peak, Kakarpo has had its plumes cropped on the new edition of the Indian Survey map, and no longer figures as a snow peak. The range appears to be composed chiefly of granite.

Paima Shan is a snowy range, part of the Mekong–Yangtze divide between lat. 28° 10′ and lat. 28° 25′. It does not exceed 15 miles in length, with four or five snow summits. On the west flank there appear to be no glaciers. From those on the east flank rises the Kari river. They all show signs of long-continued retreat, which is still in progress. A good view of the whole range is obtained from the high plateau between the Mienchu La and the Paima La, on the route between Tungkhuling and Atuntze. The view from Kakarpo is more distant and less convincing. Indeed, from this direction they would hardly pass for snow peaks but for the fact that one of the glaciers of Tsaya, the highest peak, is just visible.

There is a difficult pass across the range immediately north of Tsaya,

THE ICEFALL OF A KAKARPO GLACIER

THE DOUBLE FOOT OF THE DAMYON GLACIER

A GLACIER ON KAKARPO

TSAYA, PAIMA SHAN:
Glacier source of stream on right: Amoeboid glacier of north face on left: Pass on extreme right

the trail crossing the foot of a glacier. On the right-hand side, *i.e.* north, is a small " dead " glacier (or corrie glacier) facing the valley of Atuntze ; there is no snow peak here, however. There are three distinct glaciers on Tsaya, and two more on Omagu, the next peak to the south. Beyond Omagu are two smaller peaks, each with one glacier. All these discharge into a deep valley which runs from north to south at the western foot of the range ; and this stream appears to be the source of the Kari river, the evidence for which is as follows : The Kari river is formed by the confluence of two streams which unite just below the village of Kari. From this point to the Kari pass, whence one of the streams is derived, is just 7 miles ; and to the head of the Paima Shan valley, due north 23 miles. From this confluence, however, to the source of the main stream, as shown on Davies' map, is only 14 miles. But this main stream, from the north, is enormously greater than the stream from the Kari pass, and it is inconceivable that, with an identical rainfall, the source of the main stream is only twice as far distant as that of the small tributary descending from the Kari Pass, unless indeed it rises amongst very lofty snow peaks. For the Kari river at this point is still a formidable stream, and it has moreover all the appearance of a glacier torrent.* I may add that Dr. Handel-Mazzetti is quite of the same opinion as to the source of this stream.

The only reasonable alternative is to suppose a group of high snow peaks immediately south and west of Tungkhuling, from which the Kari river rises ; and for this there is no evidence. The glacier stream from Paima Shan rises from the glacier on the north face of Tsaya, crossed on the way to the pass over the range. It flows at first northwards, then east round the shoulder of the pyramid, leaving a glacier lake at the angle where it turns ; though most of the water does not flow through the lake now. While flowing east it receives the drainage of the big " amœboid " glacier on the north-east face. Finally it turns south. Streams from the limestone range east of Paima Shan flow west or south-west to join the main stream. Photographs of this mountain were published in the *Geographical Journal* (48, 56, July 1916, and 56, 188, September 1920). Gill writes that the Chinese name Paima Shan, or Paina Shan, is probably an attempted translation or transliteration of an old Tibetan name—a conclusion not supported by modern Tibetan nomenclature, at any rate. He adds that the present Tibetan name is N'geu-La-ka (surely it ought to be N'geu ka La ?), or the mountain of Atuntze (' River of Golden Sand,' vol. 2, p. 239).

The entire Mekong–Yangtze divide is intensely glaciated, but these appear to be the only surviving snow peaks between Yakalo in the north and Weisiting in the south, though there are several " dead " glaciers north-east of Atuntze.

* ' From Kari we followed the stream . . . to its junction with Chin-chŭ [Kari river], a beautiful clear river 16 to 20 yards wide, coming from the west, and flowing rapidly through a pretty valley " (' The River of Golden Sand,' vol. 2, p. 253)

TSAYA, PAIMA SHAN.
Glacier source of stream on right : Amœboid glacier of north face on left : Pass on extreme right

A GLACIER ON KAKARPO

Paima Shan has never been recognized or marked as a snow peak on any map with which I am acquainted. The range seems to be composed entirely of porphyry.

Damyon is a hump of porphyry, composed indeed of the same rock as Tsaya, situated on the same range as Kakarpo, but separated from the northern Kakarpo peak by 40 miles of mountains amongst which no snow peaks are visible. There are, however, in this gap numerous "dead" glaciers, one of which is shown. A photograph of the peak was published in the *Geographical Journal* (62, 7, July 1923).

The Damyon group is well seen from any of the passes above Yakalo, which lead from the Mekong to the Chiang Ka river, namely, from north to south, Lhong La, Bi La, and Kia La. I crossed the Lhong La in 1911, and caught sight of Damyon, then known to me under the name Ta-miu ('Land of the Blue Poppy'). Bailey, crossing the Kia La in the same year, did not see them, as they were then buried in cloud; but when I crossed the Kia La and subsequently the Bi La in September 1922, I had a perfect view. There are only two snow peaks, connected by a saddle, the southern one being the higher. Damyon has two glaciers on its south-east face, uniting below and discharging into one valley. This stream, after receiving a contribution from the Pitu La, enters the Mekong below Legong.

The glaciers of Damyon were formerly far more extensive. The existing glacier extended many miles down the main valley, which it now scarcely reaches; and from every side valley a glacier entered the main ice stream. The Pitu La also was glaciated, and so too was the Kia La on the opposite side of the Mekong, on neither of which does so much as a "dead" glacier remain to tell the story.

The Damyon peak is most easily approached from Legong by following the torrent northwards up the valley. Mules can be taken almost to the foot of the glacier, but not beyond the head of the valley. The trail leads nowhere, save by a difficult path back to the Mekong. It was formerly a pilgrim route round Damyon—though as a matter of fact it impinged on, but did not make the circuit of, that mountain.

The Pitu La crosses the Damyon range at its southern end. Northwards there seems to be no way across until the Ghotu La is reached; the explorer A—K crossed the Ghotu La from Sambaduka, and his information is all there is from this part. The name Damyon is neither Tibetan nor Chinese. Probably it is of Moso origin. On some maps the range is marked Kha kar po; but this is incorrect. The height of Damyon is probably about the same as that of Paima Shan—in the neighbourhood of 20,000 feet.

Gangkaling.—Strictly speaking, the Gangkaling range is in Szechwan, not in Yunnan, though close to the provincial boundary. However, it is convenient to consider it here. The Gangkaling range comprises three needle peaks, each between 19,000 and 20,000 feet high.

Their position I was able to fix with fair accuracy from two peaks on the Yungning plain, observations to which had already been taken from a measured base on the plain. The peaks may also be seen from the pass at the southern end of the Yungning lake, on the road to Yungpeh, and from the cliffs above Muli. A distant view of them is also obtained from the plateau above the Litang river, to the east. The range rises west of the Sholo river, one branch of which appears to rise from the snowy peaks.

Davies glimpsed the Gangkaling peaks when marching from Kulu to Muli, but says nothing more about them. Bacot visited Gangka Ling monastery in 1909—apparently the first and last European to do so. He does not mention any snow peaks, though he must have been very close to them; but he writes: "Il pleut, malgré la saison qui devrait être sèche. La pluie en Octobre est dans ce pays aussi singulière que le serait la neige au mois de juin en France" ('Le Tibet Revolté,' by J. Bacot).

The range is called Gangkaling (གངས་ཀ་གླིང་, "the snowy place"), after the monastery of that name at its foot. The names of the three peaks are said to be Gangka, Nyapo, and Soni.

The 1919 edition of the Indian Survey's map of Tibet, which is as prolific in snow peaks for Szechwan as it is niggardly towards Yunnan, marks a big range some 50 miles long here, height 19,000 feet. The altitude is about right, but the range is not so extensive as shown.

Gompa La.—Of all the snow peaks in Yunnan this is the least known. It has been seen by few travellers and crossed by still fewer. No one has ever explored or climbed it. However, it is shown on Handel-Mazzetti's map of his travels in Yunnan, which is excellent as far as it goes.

The Gompa La (དགོན་པ་ལ་, "monastery mountain") is on the Salween–Irrawaddy divide just above the village of Tramutang (Chamutong) on the Salween, in about lat. 28° 2′. Its name is derived from the monastery of Tramutang. It is visible from several passes over the Mekong–Salween divide, notably the Londre La (a pass immediately south of the Dokar La), the Nyiserrigo, above Bahang, and from a low internal pass above Kieunaton. Indeed, it is visible from the Salween valley itself at Tramutang—a striking tribute to the difference between the Mekong and Salween valleys.

Gompa La appears to have escaped even the eagle eyes of the Indian surveyors, working from the Irrawaddy side, though from that direction the mountain is probably far less imposing to look at. Undoubtedly the Salween–Irrawaddy divide is invisible the greater part of the year. If a glimpse of it is obtained between January and June, it is almost impossible to discern which are snow peaks and which are not. I have, however, on three occasions seen it in October and November from

three different places, and am thus able to give a definite description of it, as seen from the east. There is, to begin with, only one snow peak, which sends down three glaciers towards the Salween. Two of these join up below, and discharge into the main valley over a cliff. The third follows an independent course, but discharges into the same valley lower down. There appears to be a fourth glacier flowing north; but it is in any case much smaller than the other three. On the south-west face is a single small hanging glacier, high up in a couloir.

Dr. Handel-Mazzetti, who crossed the Gompa La in the summer of 1916, writes to me that he saw no glacier on the Gompa La, and only a very small one on a peak he calls Schatsakon, a few miles to the south. But this statement is not borne out by his own map, which shows a large glacier on the Gompa La, and the veriest remnant of one on Schatsakon. The existence of this latter is doubtful, as the whole range was visible day after day in October, and I saw no trace of it.

The height of the Gompa La can only be assumed from the height of the pass. The peak rises in an almost sheer cliff above the pass to a height of perhaps 3000 feet, giving a total height for the mountain of about 17,000 feet. The glaciers once extended much further down the valley. The Gompa La, like Tsaya and Damyon, is built up chiefly of porphyry, which rests on limestone.

Other Snow Peaks.—There is a snow peak on the Mekong–Salween divide south of the Si La, in about lats. 27° 30′–27° 45′. Looking south from the mountain above Atuntze, it is quite a conspicuous object, owing to a big snowfield on the east flank.

I know of no other snow peaks on this range; but Dr. Handel-Mazzetti informs me there are several "dead" glaciers south of the Dokar La. The same authority denies the existence of my snow peak in lat. 27° 40′, so that I can only leave the disagreement to the next traveller to unravel.

Between the Chu La and the Pitu La I counted five "dead" glaciers, but saw no snow peaks between the northernmost Kakarpo peak and Damyon.

Going much further east, from above Muli I observed a snow peak in the east, probably within the loop of the Yalung river, just as the Likiang range is situated in the loop of the Yangtse, and Namcha Barwa in the loop of the Tsangpo.

The range of snow peaks seen from the Pitu La, on the west bank of the Yü chu, is of course in Tibet proper, and forms part of the watershed between the Salween and Yü rivers. I counted eight glaciers on the eastern face of the range, all discharging into the Yü river.

It is possible that Orpor, a twin snow peak visible from the Chu La, is on this same range, further south; but Orpor is certainly not visible from the Pitu La.

Here, however, we are overstepping the boundaries of Yunnan. I

wish merely to emphasize the fact that, up to a point, the further one travels north-westwards the more snow peaks one meets with, and the more obviously they are gathered into great ranges. This is due in part to their greater altitude, and in part to increasing precipitation. After a certain distance, however, the drier regions behind the rain screen of the Himalaya are reached, and snow peaks probably become scarcer again. The greatest concentration would seem to lie in the almost unexplored region lying in lat. 28°–30° and long. 96°–98°.

There are, however, many fine snow peaks in the almost equally unknown Tibetan Marches, and I may fitly close this brief survey with a note on what I believe to be the highest peak in these parts. This was a snow pyramid seen from Paima Shan in a north-easterly direction, some distance away, across the Yangtze, in Szechwan. Judging by its apparent height at that distance, it must have been even more lofty than Kakarpo.

NOTES ON THE VEGETATION OF BURMA

L. Dudley Stamp, B.A., D.Sc., Professor of Geography in the University of Rangoon, Burma

Map following page 272.

THE following brief notes are published to enable geographers to correct the extraordinarily erroneous ideas which are contained in "vegetation maps" of Burma published in atlases and elsewhere. Some of the latter seem to be founded on suppositions (*e.g.* that tropical forest fringes the coasts and runs up the main valleys—which it does not); others on the idea that all forests are gazetted Government reserves, and that the remainder of the country is covered with grassland or scrub. Further, the vegetation has an extremely important significance in the economic development of the one of the least developed provinces of the Indian Empire. In value timber has long held third place amongst Burma's products, yet hitherto one timber alone—teak—out of the multitude of valuable species has been seriously exploited.

These notes are based mainly on the author's own observations during the greater part of three years' travels in all parts of Burma. The details of the investigations are published or are in course of publication elsewhere.*

The Factors governing the Distribution of Vegetation.

Taking Burma as a whole, two factors are of paramount importance in determining variation in vegetation. These two factors are climate

* Stamp and Lord, "The Ecology of Part of the Riverine Tract of Burma," *Journal of Ecology*, vol. 11, Sept. 1923, pp. 129–159; *Jour. Asiatic Soc. Bengal*, N.S., vol. 20, 1924; Stamp, 'The Vegetation of Burma' (in the press).

(especially rainfall) and elevation. They determine regional or major changes. If one takes an area of a few dozen or few hundred square miles, however, it is often found that the relationship between the geology and soil and the superincumbent vegetation is remarkably close. As a result of edaphic control, typical Monsoon Forests may be found side by side with dry Thorn Forest or Thorn Scrub.

Elevation affords a basis for a rough classification of the vegetation of Burma into three broad divisions:—

(i) Land above 3000 feet.

(ii) Land below 3000 feet.

(iii) Tidal areas.

The 3000-feet contour line is an arbitrary limit, but convenient in practice. Actually the dividing line between the lowland and mountain forests is to be found at a steadily decreasing altitude as one goes northwards. In Tenasserim there is little change below 4000 feet, but in Central Burma, between latitude 18° and 20°, the great change takes place at about 3000 feet. It is believed that this dividing line corresponds to the "frost-line" below which frosts are unknown; and so in "frost-holes"—local depressions in plateaux such as the Shan Plateaux—it may descend considerably lower. The seedlings of broad-leaved monsoon species are particularly susceptible to frost. For example, however abundant it may be just below, teak is practically never found above this line of 3000 feet.

The vegetation of land above 3000 feet may be called mountain vegetation—it comprises especially oak-chestnut forests, pine forests, and grassland, with rhododendron forests at higher levels. Mountain grassland would seem to be the only true grassland in Burma.

Much of the land below 500 feet, or even below 1000 feet, is cultivated, but most of the remaining land below 3000 feet is to be described as forest-covered. Rainfall determines the gradation from evergreen tropical forest at one extreme to thorn scrub or semi-desert at the other. It is important to notice that all the drier types are impoverished woodland and not impoverished grassland. Practically all the forests at present exploited are below 3000 feet.

It is convenient to deal separately with the tidal and deltaic forests, since they are, in nature, well demarcated. Two groups may be separated: (*a*) the tidal forests—"mangrove swamps," and (*b*) the delta forests just above the reach of normal high tides.

Burma is essentially a monsoon country. The rainy season lasts approximately from June to September or October. Except in the south (Tenasserim), the remainder of the year is almost rainless. November, December, and January may be said to form the cool season; in February the temperature as a whole begins to increase, reaching a maximum in April or May. Although a considerable area of Burma lies to the north of the Tropic of Cancer, the whole of the province

in its vegetation belongs to the tropical zone. The so-called "warm temperate" forests of the north are due to elevation; monsoon or evergreen tropical forests stretch as far north as does the suitable low ground.

The monsoon rains provide a deep-seated water-supply suited to the growth of trees rather than grass. In the drier regions the rain falls during a few heavy downpours in the wet season, and the surface soil is rarely damp for long. The climate is, then, a woodland and not a grassland climate, though often sufficiently favourable to the growth of grass to make the latter a serious enemy of the forests.

In the course of this investigation it has been found that there are two isohyetal lines of marked importance—40 inches and 80 inches. Speaking of the area below 3000 feet, these two lines divide Burma climatologically into three parts:

(i) The Dry Belt with a rainfall of less than 40 inches, resulting from its situation on the lee of the Arakan Yomas. The lowest rainfall recorded is about 20 inches. A rainfall of less than 40 inches is insufficient for the proper growth of forests, and the cultivated crops—sessamum, millet, ground-nuts, etc.—in this region are quite different from those in other regions.

(ii) The regions with a rainfall of from 40 to 80 inches: the home of the Monsoon Forests—forests which are leafless during the hot season and of which the teak forests are typical examples. In some cases teak may flourish with a rainfall of 90 inches or more, but it is not typical, and becomes practically absent where the rainfall reaches 100 inches. Most of the Shan Plateau—a great area over 3000 feet—seems to enjoy a rainfall of 40 to 80 inches, but is of course covered with the appropriate mountain vegetation.

(iii) The regions with a rainfall of over 80 inches: the home of the evergreen tropical forests—increasing in height and luxuriance southwards as they approach the belt of rain at all seasons. These forests cover enormous areas in Burma, but as yet have been little exploited. The timber is mostly hard, and species varied, and here is a vast store of magnificent cabinet woods.

Except in regions of very high rainfall, geology is nearly always the controlling factor in local distribution, its control being shared only by that of aspect. To some extent geology and climate counteract one another, the same plant formations occurring both on physically dry sands with a low rainfall and on physiologically dry soils (especially gypsiferous clays) with a much higher rainfall. The uplands are formed of old hard rocks, the lowland regions mainly of Tertiary strata. Edaphic control over selected areas has been dealt with in detail elsewhere.

The Main Types of Vegetation.

The principal types of mountain vegetation—growing above the supposed "frost-line"—are oak-chestnut forests, pine forests, rhododendron

forests, grassland, bracken, and bamboo brake. The oak forests are very widespread, and vary from close damp forests to open forests with much grass. In the extreme north the trees are said to have boles unbranched to a height of 40 feet. There are many species of *Quercus*, together with *Castonopsis*, *Ilex*, etc. These forests are evergreen. Normally the pine forests occur at a somewhat greater elevation, and are more restricted in their distribution, flourishing on lighter soils. *Pinus Khasya* is the common species. In Tenasserim *Pinus Merkusii* occurs locally and sometimes at much lower altitudes. The rhododendron forests occur at considerably greater altitudes. Up to a certain height the trees increase in size, reaching a maximum in the north of Burma at an altitude of 7000 to 9000 feet; thence they rapidly decrease in size, the ground at 12,000 feet and upwards being clothed with a carpet of dwarf alpine species. Grassland, apparently as a climax community, covers large areas of the Shan Plateau where extensive regions of short springy turf are strongly reminiscent of English downland. The tops of ridges elsewhere are often clothed with rank grass, 2 to 4 feet high. The grassland of the Shan Plateau frequently seems to occur on fissured limestone, to which its presence may be due. The wild flowers of these areas are remarkably European in their general aspect. The bracken brake and bamboo brake which clothe many hillsides result largely, if not entirely, from the "taungya" system of cultivation, practised throughout Burma. The forest is cut down and burnt off, and the ground cultivated for one or two seasons and then allowed to return to jungle. Deserted taungyas are, however, invaded by bamboo and bracken which successfully prevent natural re-afforestation. This terribly wasteful system of cultivation cannot be too strongly condemned.

Evergreen tropical forests may be taken to embrace all evergreen forests occurring on land up to 3000 feet, but excluding the tidal and semi-tidal forests. The minimum rainfall is 80 inches. This type of forest clothes the greater part of Tenasserim, and much of Arakan, as well as occurring in the southern part of the Pegu Yomas and over considerable areas in the north. It is perhaps only in the extreme south that the forest attains one's preconceived ideas of an evergreen tropical forest. These words are being written within sight of the luxuriant untouched forests of the Mergui Archipelago—forests of tall varied trees whose dense canopy, cutting off nearly all light from the ground, is made still more intense by the wealth of woody climbers which have struggled upwards to reach the light. The number of species present is very great, and the forests are still little known. In the better-known regions *Dipterocarpus spp.* are very typical, but the distinction between these evergreen Dipterocarp forests and the dry Dipterocarp forests should be carefully noted.

Under Monsoon forests may be included the leaf-shedding forests found on the lower elevations (up to 3000 feet), with a rainfall of about

40 to 80 inches or slightly more. A number of types, determined mainly by rainfall, may be separated. They are: Pyinkado or semi-evergreen, moist teak, dry teak, Indaing and Pyinma or plains forest. All the most important, as far as the present time is concerned, of the exploited forests belong to this group. The period of leaf-fall varies with the rainfall, being earlier in the drier parts, from January (with some species much earlier) to the end of March; the new leaves appear with the rains in June.

The semi-evergreen forests are characterized by the pyinkado or Burma ironwood (*Xylia dolabriformis*), but include some of the *Dipterocarps* of the evergreen forests. Teak forests flourish best on the well-drained moderately light soil such as is furnished by the Tertiary Sandstones (*e.g.* of the Pegu Yomas). Teak rarely furnishes more than 10 per cent. of the total trees; in the damper types Pyinkado is often numerically superior, whilst in the drier types the species of the Indaing are abundant. Clumps of bamboo occur in nearly all teak forests, but different species characterize the moist and dry teak forests respectively. Pyinkado is a very heavy wood and will not float; bundles of bamboo are used as floats for the timber rafts. The Indaing is an interesting type of forest which flourishes on very light sandy soil—even pure sands—under conditions of less rainfall than the normal teak forest. The two dominant species are *Dipterocarpus tuberculatus* (in) and *Pentacme suavis* (ingyin), and the Indaing may be called the dry Dipterocarp forests. These forests are more open, and there is an abundant undergrowth of grass with scattered Cycads, but bamboo is absent. The Pyinma or *Lagerstroemia* forests occur under the rainfall conditions of the moist teak forests, but on poorly drained—especially alluvial—soils.

The vegetation of the Dry Belt ranges from open grassy forests, which may be called savannah forests, through thorn forests to thorn scrubs and semi-desert. The writer and Mr. Lord have separated a number of types which are well marked in the drier regions of Burma, and whose distribution is controlled mainly by edaphic factors. The richer woodlands in the dry belt yield posts for local building and large quantities of firewood, but very little exportable timber. The savannah forests are often very open, and their chief undergrowth is grass. Bamboo is absent except for occasional clumps of *Dendrocalamus strictus* (myin). The thorn forests are characterized by spiny species of *Acacia*, and often have many wood climbers. *Acacia catechu*, replaced sometimes by *A. leucophloca*, as a shrub, is the characteristic plant of the thorn scrub. These species of *Acacia* are also found in the extreme type of vegetation in the driest regions in association with fleshy species of *Euphorbia*.

The true tidal forests are usually called "mangrove swamps," but the species included under the name "mangrove" are numerous and varied. They agree generally in the leathery nature of the leaves; in some places

one species is dominant, in other places another. Common forms include *Rhizophora Heritiera*, *Ceriops*, *Bruguiera*, *Sonneratia*, and others. Mangrove swamps fringe very many of the islands of Tenasserim, the coasts of Arakan, and the Delta.

The most important of the delta forests, occurring above normal high-water mark and covering very large areas of the Irrawaddy delta and Mergui, are the Pinle-Kanazo (*Heritiera minor* and *H. littoralis*) forests. They furnish the fuel supply of Rangoon, and valuable timber is available besides.

It is convenient to use the term "seral" to embrace those plant formations which have not yet reached the normal climatic climax of the region. One of the most striking examples is the Kaing, or Elephant-grass jungle which clothes the sandbanks of the river Irrawaddy. As the sandbank becomes permanent and rarely subjected to floods trees develop, and doubtless the land would gradually pass into forest. Actually most of such land is cultivated.

Semi-natural vegetation covers unexpectedly large areas of Burma. The wasteful system of taungya cultivation has been extensively practised, not only amongst the hill forests, but amongst many of the fine monsoon and evergreen forests. It is probable that most, if not all, of the bamboo brake has been caused in this way. "Grass blanks" occur in many teak forests, and there are large stretches of savannah-like country—scattered trees and coarse grass. Everywhere clearance of the forest has given bamboo and grasses an opportunity to establish themselves. In drier regions the thorny scrub, *Zizyphus jujuba*, springs up with amazing persistence on deserted rice-lands, together with such plants as *Capparis horrida*.

On the map the distribution of the main types of vegetation has been indicated, but it has not been possible to separate the patches of semi-natural vegetation and the areas covered by the several communities.

The Timbers and Timber Trade of Burma.

Forests of valuable timber cover at least 130,000 square miles in Burma—over half the total area of country. The Government Forest Reserves cover only about 30,000 square miles of this total. Teak, and a much less extent Pyinkado, are the only timbers which have been seriously exploited, and teak is the only one known outside India. Once the many other valuable timbers of Burma become known, there can be no doubt that they will be in great demand in European markets. Exhibits of the more important timbers are to be seen at the British Empire Exhibition.

In exploitation, most of the trees are killed by girdling—cutting away the sapwood the whole way round at a short distance from the ground. The tree is allowed to die and dry for three years before felling. After felling it is dragged by elephants or buffalo to the nearest watercourse.

The logs are floated down during the rains into the main streams. The watercourses in the forests themselves are but mountain streams, and the successful removal of the timber may depend on two or three "rises." It may be two or three seasons before all the timber actually felled can be removed in this way. The timber from the Pegu Yoma forests is brought down either by the Hlaing river (to the west of the range) or Sittang river (east) to the saw mills at Rangoon. From other parts of Burma the Irrawaddy is the great highway, and the timber is built into rafts before being floated down the main river. The Salween in its lower course is also used.

It would be hard to find another part of the British Empire where the timber resources are so extensive, so varied, and so accessible, and yet so little appreciated.

THE WILTON CODEX OF PTOLEMY MAPS

THE sale at Sotheby's on July 28 of a fine set of MS. Ptolemy maps from the second half of the fifteenth century brings into prominence once more the question of the Ptolemy MSS. and their relationships, both among themselves and with the early printed versions of the Geography. These maps, which were formerly in the library of Wilton House, Salisbury, having been purchased by the eighth Earl of Pembroke (1656–1733), had come into the market in 1914, when they were bought by a Continental collector for £1800. At the recent sale they fell to Messrs. Maggs at the greatly enhanced price of £2975, and though the name of the actual purchaser has not yet been disclosed, there is little doubt that they have once more left this country, and will be out of reach of British students without a special visit to their present home. It is to be hoped that their new owner's name will be made known in due course, so that the volume may not pass out of the ken of those seriously engaged in Ptolemaic researches.

There can be no doubt that the MS. deserves careful study from competent scholars, and we may hope that the foremost modern student of Ptolemy, Prof. Josef Fischer. S.J., may have had the opportunity of inspecting it during its stay abroad. Even such cursory examination as was possible at the sale room, on the two recent occasions on which it changed hands, sufficed to show its interest, and the short account printed in the sale catalogue suggests various points for further study. The writer of the note draws somewhat positive conclusions as to the history of the MS., and as he is evidently well versed in the history of Ptolemy documents, they no doubt merit careful consideration even if we think them in some ways open to question, as will be shown presently.

The maps contained in the document are the traditional twenty-seven found in one of the two main types of Ptolemy MSS., and (with one exception) are drawn by hand on vellum and finely coloured—water in deep violet, mountains in yellow, names in purple, the whole liberally embellished with gold, etc. They are painted on the inner sides of twenty-seven vellum leaves, and the twenty-six MS. maps have a descriptive text on the outside, with fine ornamental borders. The first map, which, like the first leaf of the second,

has suffered somewhat from wet, is not in MS., but, in the main at least, is printed (on vellum) from the plate used for the World-map in Berlinghieri's metrical version printed at Florence about 1478–80. But the general style of the colouring agrees so closely with that of the other maps that it seems certain that this map must have been added at or very near the date at which the others were drawn. On a casual inspection the map might be taken for a MS. like the others, for the original print has been rendered so faint in places by the wetting that much of the detail has had to be subsequently restored by hand. As is natural in such a case, a good many names or words have been misread by the restorer, so that many minor differences from the true Berlinghieri map are at once observable, almost suggesting that there must have been a now unknown second state of the Berlinghieri plate, until the extent of the manipulation is realized. The original detail has so completely vanished in parts (*e.g.* the degree numeration at the lower edge) that one is tempted to doubt if it ever was there, but to suppose that the MS. matter was added to a proof taken before the engraving had been completed. In any case some of the detail, for instance the scrolls round the names of the winds, and (in their present state) the heads representing the winds, are purely MS. additions, and an expert could perhaps determine from them the approximate date of the restoration.

It may be well to state briefly the general conclusions put forward in the Note in the sale catalogue. At the time of the sale in 1914 it had been pointed out that the MS. bore a close resemblance both to the famous Ulm Ptolemy of 1482 and to the Wolfegg Codex written by "Donnus" (*i.e.* Dominus) Nicolaus Germanus on which that edition was based, as shown by Prof. Fischer. It was therefore suggested that it too was from the hand of Ds. Nicolaus. This view (hardly probable in any case owing to the different style of the script) has now been modified, and it is held that the present MS. is "practically without doubt the original on which both the Wolfegg Codex and the Ulm Ptolemy are based," which implies that it was actually in the hands of Nicolaus when he made his version. The writer ventures on the further suggestion that the set of maps (the Italian origin of which is unquestionable) was sent to Nicolaus in Germany by his Italian humanist friends.

Before discussing these views it may be well to recall the main points in regard to Ds. Nicolaus' re-editing of Ptolemy, which seem to be established by Prof. Fischer's researches. To begin with, the old tradition (accepted by the writer of the note) that Nicolaus was a Benedictine monk "of the famous monastery of Reichenbach" (in Bavaria) is shown to rest on very slight foundation—merely the "ut ferunt" of the contemporary writer Trithemius, who moreover states elsewhere that the monastery of Nicolaus was not known to him ("memoriæ non occurrit"). It is known that Nicolaus had been in Florence in 1466 (or earlier) before offering his first MS. edition to Prince Borso d'Este, and it has been supposed that the work on this was done in Italy,* where the best earlier Ptolemy MSS. were preserved. A second recension was carried out about 1474, and a third, represented by the Wolfegg Codex, must have been completed by 1482, the date of the first edition printed at Ulm, which closely follows it. Now when the writer of the note says "The Wolfegg Codex must have been prepared by Brother Nicolaus from this MS." (*i.e.* the Wilton Codex) we feel that fuller study and comparison of

* The addition of "Germanus" to his name in itself implies that he resided for some time outside Germany, as it would have been an unnecessary distinction otherwise.

the various documents are necessary before this can be definitely accepted, and we are hampered by the absence, so far, of any full description or reproduction of the MS. types. The main differences between the three editions of Nicolaus seem however to be as follows: the first is said by Fischer to have formed the basis of the printed Rome edition of 1478, and we may therefore suppose the world-map to have been on the first of Ptolemy's projections, with rectilinear meridians. This version gave no modern maps. The second MS. version gave a map of the world on Ptolemy's second projection, with curved meridians, and added three modern maps, that of the northern regions showing Greenland after the generally correct pattern of the Claudius Clavus maps. The third version was generally similar, using the same projection for the World-map, but adding two more modern maps, while the map of the north was changed by the shifting of Greenland to a position *east* of Iceland and north of Scandinavia.

Now when the Wilton Codex is claimed as the basis of the third edition (the Wolfegg Codex) we should like to know more of the reasons (which may no doubt exist) for associating it with this rather than with the second edition, seeing that the map of the north—the chief point of distinction between the two—is not included, nor is there a world-map with the misplaced Greenland, as in the Wolfegg Codex.* In any case, as the material for the modern maps does not occur in the Wilton Codex, this cannot have been the *sole* basis for either the second or third recensions. It may also be asked what definite proof there is that a MS. of the *type* of the Wilton Codex was not used for the first recension, of 1466. Even if the projection of the world-map is different, this need not weigh greatly, since we know from the dedication to Prince Borso d'Este that Nicolaus plumed himself on his originality in the choice of a projection, at least for the special maps, and if he departed from his pattern for these, he might equally do so for the world-map, thinking perhaps that the projection with rectilinear meridians harmonized better with the trapezoidal form of the special maps, though he adopted the curved meridians in his later versions. And there are certainly some details in which the Wilton Codex shows more agreement with the printed Rome edition (and therefore presumably with the 1466 MS.) than with that of Ulm. In our hasty inspection of the Wilton Codex two points were noted in the first two MS. maps, namely the representation of the Orkney group and of the Pyrenees, and in both cases the closest agreement is with the Rome version. Now if Nicolaus used a MS. of the Wilton type in or before 1466 the idea that this particular copy was sent to him later in Germany falls to the ground, for it would give him no material that he had not already before him in 1466, nor could it suggest the projection for the World-map, which had already been used by him in *c.* 1474.

It will be remembered that Nicolaus was in Florence in 1466, and we find perhaps a slight indication of the use by him of a Florence MS. at that date in certain agreements also to be seen between the Rome Ptolemy of 1478 and the almost contemporary Florence version of Berlinghieri rather than between the former and the Ulm edition of 1482—agreements which include the cases of the Orkneys and Pyrenees above referred to. This suggests as desirable a careful comparison of the Wilton Codex with the Berlinghieri

* We are for the moment supposing that the sale catalogue is correct in assuming the approximate date of 1460 for the Wilton Codex. If, as seems possible, it is contemporaneous with the added World-map, it could not of course have been used for the edition of *c.* 1474

edition, with which (setting aside the question of projection) it appears to agree in general style more than with the Ulm edition. This is specially to be seen in the very similar method of showing the mountain ranges, which differs from that used either in the Rome or the Ulm versions. The Berlinghieri maps appear to be based on a fine MS. still preserved (as is one of Nicolaus') in the Laurentian Library at Florence (Plut. xxx. No. 1), which, like it, contains four modern maps—of Spain, France, Italy, and the Holy Land.* That of Italy was reproduced in 1917 at Florence in honour of the marriage of Prof. Almagià (*Journal*, vol. 50, p. 298), and in its general style shows a striking agreement with the Wilton maps. All this strengthens the idea that the engraved map taken from Berlinghieri formed part of the collection from the first. Its use might plausibly be explained on the supposition that this map was put in hand first of all the Berlinghieri set, and that a proof impression might thus be available several years in advance of final publication. This would also fit in with the fact that the Wilton Codex lacks the four modern maps, which would probably be the last to be drawn. That they *are* present in the Laurentian Library MS. (Plut. xxx. No. 1) argues an earlier date for the Wilton Codex, but hardly so early as to suggest its use by D. Nicolaus for his *first* MS. version, at least if the World-map was included from the outset; and if not for the first, why at all, since it would supply no information not already in D. Nicolaus' hands when the first was prepared? The omission of the modern maps from his version of 1466 seems to show that the Laurentian MS. was not known to Nicolaus at that date, nor is it likely that it was used by him later, since his four modern maps do not agree at all closely with the Berlinghieri specimens.†

In what has been said above we have been led by the example of the cataloguer tacitly to assume that if any connection existed between the Wilton Codex and Ds. Nicolaus, it was the latter who was indebted to the former and not *vice versâ*. But after all is it not possible that the Wilton Codex itself may have been based on the earlier work of Nicolaus, of which we know that various specimens were current in Italy between 1465 and 1475? If so both the Laurentian Codex and the Berlinghieri printed edition might, like the Rome version, derive in part at least from his labours.

On the whole, however, on the imperfect evidence so far available, it seems somewhat rash to assert any direct personal connection between Ds. Nicolaus and the Wilton Codex. It is possible that he used a MS. of this *type* before 1466, but it could not have been the Wilton Codex—at least in its present state with the engraved world-map included. And the idea that the Codex came into his hands later loses its force when we remember that it could then have given him no new data, and that his later versions seem to depart somewhat farther from the Codex than the earlier ones. It may be that the pages of text would supply more decisive evidence than the maps, but of these the printed note says nothing beyond stating that the ornaments are copied by the German woodcutter (in the Ulm edition). It is important to know whether the resemblance is exact or only general.

The new owner would confer a boon on students did he agree to the publication of facsimiles of some at least of the maps, together with their descriptive text. By this means it might be possible to arrive at more definite conclusions on the points still obscure. E. H.

* Modern maps of these four countries are also given in the Wolfegg–Ulm versions, with the map of the North in addition.

† The Florence Italy is altogether better than that of Nicolaus.

MORE TALK ABOUT HANNIBAL

Hannibal Crosses the Alps.— Cecil Torr, M.A. Cambridge: The University Press. 1924. 7 × 6, pp. 40. *Sketch-map.* 2*s.* 6*d. net.*

MR. CECIL TORR, the author of the booklet noticed here, is well known to the literary public as the writer of three entertaining volumes entitled 'Small Talk at Wreyland.' In the Preface to one of these he made some disparaging comments on certain "Members of the Alpine Club," who have of recent years been bold enough to take a part in the immortal controversy as to the pass over the Alps crossed by Hannibal. Mr. Torr's strictures have brought him, he tells us, letters of protest from the critics in question, who included a former President of the Club, misleadingly referred to as a champion of the Isère route, a phrase usually employed as equivalent to the Little St. Bernard. To these letters Mr. Torr wishes his present essay to be considered as a reply.

To plunge for a second time into the maze of literature that has grown up round Hannibal's Pass is an adventure not to be undertaken except under very serious provocation! How far, we ask, do the pages before us constitute such a call or challenge?

Let us first ascertain and weigh the consideration which Mr. Torr lays down as the keystone of his argument, as in his own words "the one main point affecting the route to which all other details are subordinate." He states it as follows: "The autumn was advancing, and it was a matter of life and death for Hannibal to complete his march before the snows had made the Alps impassable. He would therefore take the very shortest route with no more digression than was really needed for getting supplies, or avoiding Scipio's army during the week he was ashore. And the shortest routes are by the Col de la Traversette and the Col de l'Argentière." Mr. Torr proceeds to express his preference for the former of the two passes on the ground of the prospect it affords over the Plain of Piedmont. For, next to shortness, the most important qualification that an Alpine pass can possess in Mr. Torr's eyes is that it should command a panorama of Italy.

Readers who are curious to know more of the history of the Col de la Traversette from the fifteenth century onwards will find it told at length, and illustrated by contemporary documents, in a tract by the late Signor Vaccarone, the full title of which is given below.* Its claim to be considered Hannibal's Pass was first asserted by the Marquis de St. Simon, who suggested that the "promontory" Hannibal used as a platform was Monte Viso itself. He has been supported in more modern times (1830–1) by Mr. H. L. Long and an anonymous "Member of the University of Cambridge."

At this point Members of the Alpine Club—and possibly some others—may note with surprise that no reference is made to the relative height of the two passes in question. Yet height counts, or ought to count, as much, if not more, than distance with a leader called on to select a route for his army through a mountainous district in late autumn (it was the middle of October). And the Col de la Traversette is 3100 feet higher than the Col de l'Argentière—the figures, nowhere given by Mr. Torr, are respectively 9679 feet and 6545 feet—while the distance to be traversed through the mountains is about the

* 'Le Pertuis du Viso: Étude Historique d'après des documents inédits conservés anx archives nationales de Turin, par Louis Vaccarone.' Turin: F. Casanova. 1881.

same by the two passes. Further, the Col de la Traversette is approached from the west by savage gorges and through bare and barren valleys, while the pass itself is over a very steep ridge, the final comb of which was in A.D. 1480 pierced with the aid of *ferrum* and *acetum*, 380 feet below the top, by a tunnel 246 yards long in order to make the pass serviceable for mule traffic. The western access to the Col de l'Argentière, on the other hand, lies over gentle, habitable slopes, cornfields and pleasant pastures, while a considerable lake lies on the broad and level summit of the pass.

These physical facts surely suggest an obvious, if not fatal, flaw in Mr. Torr's argument, one affecting vitally his main conclusion. Readers, bearing this in mind, will I hope excuse me from any attempt to explore in detail many of the minor allegations and conjectures our author advances in its support. I propose to confine my comments here to a few of the more salient points in his ingenious essay.

It has already been noted that it is the requirement of a pass with a view which leads Mr. Torr to the Col de la Traversette. He presses this consideration with the zeal of a convert. I use the word advisedly, for in the first volume of 'Small Talk at Wreyland' he wrote, "I doubt if Hannibal ever did look down. I think he may have shown his men the line of march on a map"!

For my part, I must confess, I find difficulty in taking this suggestion seriously. Perhaps it was not meant so! At any rate, Mr. Torr now writes explicitly. We read, "Whatever pass it was that Hannibal crossed, the summit must have commanded a wide view of the Plain of the Po, otherwise he would not have made his speech there. There is such a view from the Col de la Traversette, but not from the summit of the Mont Genèvre pass or from the Col de l'Argentière, or in fact from any other pass southward of the Little Mont Cenis or the adjacent Col du Clapier."

As a matter of fact, there is no view of Italy from the Little Mont Cenis, but this is immaterial in the present argument.

On the point here at issue, the requirement of a view of Italy from the pass, I must continue to be wholly sceptical. I cannot bring myself to enter into the minds of the critics who insist on our accepting and taking literally the phrases of the oration alleged to have been delivered to his troops by Hannibal on the crest of the Alps. Classical historians were in the habit of lightening their narratives by putting dramatic speeches into the mouths of their leading characters, and I hold that Polybius and Livy were quite capable of using the arrival of the Carthaginian army on the Alpine watershed as an occasion for an appropriate harangue from their leader.

Nor would I deny that Hannibal may very possibly have actually seized the moment to encourage his men by pointing out that Italy was beneath them and that the rest of their road would be downhill. But, if he did so, I should expect that, being more like Napoleon than Bädeker, he framed his address rather in the form of an appeal to their imagination than in that of a description of local facts.

I do not, of course, dispute that if a view of Italy is necessary the Col de la Traversette is one of the few passes which can supply it. But I may point out in passing that there is no room for an army to camp near its top, and that Hannibal is said to have spent two days on the alpine crest.

I wish to be fair, and I therefore pause for a moment here in dealing with Mr. Torr's argument to express my surprise that in maintaining the claim of the Col de la Traversette against that of the Col de l'Argentière he has not

dwelt more on the undoubted difficulty that exists in fitting the accounts given of the snow conditions encountered on the descent into Italy with any spot on the route of the Col de l'Argentière. The incidents recorded are, in Polybius's words, "singular and unexpected." New-fallen snow is described as covering snow of the previous winter; yet, if Livy is accurate, the spot was far below the snow-level, there were stumps and brushwood at hand and big trees not far off. I have done my best elsewhere to suggest an adequate explanation. I will not repeat it here, but content myself with calling attention to the Marquis de St. Simon's account of the passage of "The Barricades," in Val di Stura, by a French army in November 1744—very little later in the year than Hannibal's—which I quote in 'Hannibal Once More' (pp. 41–8).

The next disputable item I find in Mr. Torr's argument is his confident assertion that the Island of the classical historians is the district between the Rhone and the Durance, and not that between the Rhone and Isère. I waive here all calculations as to distances marched, or the evidence to be drawn from the conjectures of editors and commentators as to the doubtful readings of local names in the MSS. of Polybius and Livy, though on the latter Mr. Torr lays great stress. I am content to point out that the geographical description given by Polybius of the district in question, "The Island," corresponds in its details with the country north of the Isère, while it cannot reasonably be forced into any correspondence whatever with that enclosed between the Rhone and the Durance. I must add that if I express myself confidently on this point, my opinion is founded, not on hearsay, but on several visits to both the districts in question. Mr. Torr, I do not forget, makes the suggestion that the northern Island is not triangular but quadrilateral. But if he will be at the pains to trace its extent accurately off a large-scale map he will, I think, agree that it is pear-shaped and may most fairly be described as an irregular triangle.

The transference of the Island down to the Durance obviously implies as a necessity fixing the crossing of the Rhone somewhere near Beaucaire, opposite Tarascon, and not at Roquemaure above Avignon, 30 miles higher up the river. But Polybius says the crossing was four days' march from the camp by the sea, which has hitherto been taken to mean Scipio's camp at Fos, and Fos is under 40 miles from Beaucaire. So Mr. Torr tries to get over the discrepancy by calculating the four days' march from the westernmost mouth of the Rhone in the neighbourhood of Aigues Mortes. But there is no ground for thinking Hannibal ever camped near Aigues Mortes. The Roman road from Spain, or the track along which the Roman road was subsequently made, and along which Hannibal came, ran straight from Montpellier to Nîmes. Before leaving the question of the location of the crossing, critics who argue that the expression "at the single stream" fixes it near the spot where the Rhone divides into two branches at the entrance to the delta may do well to study carefully that portion of the 1/80,000 map of France which is reproduced in Colin's 'Annibal en Gaule' (Paris, 1904). They will find that both above and below the single stream (now bridged) at Roquemaure there are large islands, one of which would fit in very well with the account given by Polybius of the way in which a division of the Carthaginian army under Hanno was thrown over in advance of the main force. Polybius, it may be noted, makes Hanno's passage 200 stades above Hannibal's. His narrative indicates, and Livy's states explicitly, that it was one day's march upstream. Unless there is an error in the number of stades, this proves that a light Roman force could make a long day's march!

Mr. Torr next asks us to believe that Livy was mistaken in suggesting that it was the fear of a flank attack that induced Hannibal to avoid marching along the lower Durance, and persuaded him to retreat further north. Mr. Torr writes, "Hannibal would not go 200 miles inland to avoid the enemy if he knew they were not there." He gets his 200 miles by assuming Hannibal marched as far as Lyons. The whole distance from Fos to the Isère is only 130 miles. Polybius and Livy both assert that the Island was four days' march from the Passage. This then was the extent of the diversion inland caused by Scipio's advance. Further study of the texts makes it clear that Hannibal could not possibly have heard of Scipio's re-embarkation till four days after he had left his camp at the Passage, and that he must therefore have chosen his line of march without reference to it.

Again, Polybius's statement that Hannibal marched up the river eastward does not seem to me necessarily to imply that he followed the valley of the Durance. Polybius elsewhere asserts that the general course of the Rhone is to the south-west; therefore any one ascending it might easily in his view be trending eastward. Mr. Torr also altogether fails to realize the character of the Durance, at one time a raging torrent, at another easily fordable. Its spring and autumn floods come down from the mountain basins and affect equally the middle and lower portions of its course. The traveller between Gap and Embrun has abundant opportunities of observing in the wide stony bed of the stream evidence of the violence of the periodical outbursts which still make it the most formidable of the rivers of the Western Alps.

In Livy's assertion that from the confluence Hannibal turned to the left I find no serious difficulty. To any one standing at the meeting of the Rhone and Isère and facing east the shortest way to the Durance passes and Italy would lie up the valley of the Drôme, while the Isère would be relatively on his left hand.

I cannot see where Mr. Torr finds that the gorge below the White Rock lay off the direct line of march; had it done so what need would there have been to trouble about it?

Finally, the authority of the passage from Varro, quoted by Servius, describing the five passes of the Western Alps, is disparaged by Mr. Torr on the ground that we have got it only at second-hand. On this pretext he finds it legitimate to conjecture that the words used as to the second pass from the sea "by which Hannibal crossed" are an interpolation! This has the appearance of the daring, if not desperate, expedient of a partisan. I am reminded of lines quoted in one of the old books about Hannibal, more or less true of most of those who have joined in this controversy—

> "For observations we ourselves do make
> We grow more partial for the observers' sake."

Mr. Torr, as we have seen, resents the intrusion of members of the Alpine Club into the discussion of this famous historical episode. It is of course true that the large majority of his predecessors in the argument have been scholars or bookmen: writers industrious in collecting all the references to it in classical literature, ardent in investigating every statement of classical geographers that has any bearing on it, experts in elaborately computing distances, or arguing over doubtful renderings of local names in the corrupt texts of Polybius and Livy. Yet these may not be the only qualifications needed for the discussion of Hannibal's Passage of the Alps. There should be room for writers with a personal knowledge of the Western Alps and an accurate appreciation of their physical features and climate. For in the endeavour

to determine the route of the Carthaginian host it is essential to take into account matters that must have weighed on the decisions of any competent leader of an army. Among these the relative heights and difficulty of the passes available, the character of the river-crossings, and the natural resources of the districts to be traversed must have held a prominent place.

As far therefore as I can, to the best of my judgment, determine, Mr. Torr has so far failed to produce the "plausible substitute" for the Col de l'Argentière which ten years ago I declared my readiness to consider. But I recognize that no one who has put forward on his own account a claim for a particular pass has a right to pose, or can expect to be looked on, as an impartial writer. I have therefore preferred to put these somewhat fragmentary and disconnected notes on the latest, but doubtless not the last, contribution to Hannibalian literature in the form of a reply rather than in that of an anonymous review. Those who may reasonably complain of my omissions here I must refer to the little volume entitled 'Hannibal Once More' I published ten years ago.

Mr. Torr ought not to have left out the Isère on his skeleton map. But his readers will be grateful for the reproduction of two coins of Cartagena showing a Carthaginian riding on an elephant. Mr. Torr alleges that the animal's ears prove it to be of the African variety. This, however, is a detail that may best be left to naturalists, who, I understand, differ. Polybius more than once calls the drivers Indians.

DOUGLAS W. FRESHFIELD.

AIR SURVEY: REVIEW

Report of the Air-Survey Committee, No. 1. 1923.— The War Office. London: H.M. Stationery Office. 4*s.* 6*d. net.*

Stereoscopic Plotting Machines for Use in Photographic Surveying.— Col. H. St. J. L. Winterbotham, C.M.G., D.S.O. *The Royal Engineers Journal*, March 1924. Chatham: The Institution of Royal Engineers. 5*s.*

THE publication of the first report of the Air-Survey Committee marks a most important step in the development of aerial survey in the British Empire, and the members of the Committee deserve the greatest credit for the valuable work, both experimental and theoretical, for which they have been responsible. Now that the Government has before it this account of the progress already made, we may well hope that it will see its way to increase the slender monetary provision on which the Committee relies, and so to hasten the day when the Empire at large may obtain full profit from the ability to carry out air-surveys of its more remote parts with certainty and with all necessary exactitude.

The Report starts with a short account of the methods of air-survey used in the British Army during the late war, both on the Western Front and in the Near East, and of the progress which had been made when the Armistice brought military air-surveying, with its unregarded expenditure of time and money, to an end. The problems which now face the work, for the purposes of both peace and war, are then set out and details are given of the lines along which the Committee is working and of the methods and instruments which it is developing, together with some description of foreign practice and apparatus. The report concludes with an elaborate bibliography of the subject, which extends to some nine pages, with a further supplement of five pages.

In general the views put forward by the Committee are such as will meet with substantial agreement among those British surveyors who have had experience of aerial mapping. Great stress is laid on the need of special training for those pilots engaged in the work in order that they may be able to maintain a straight course along the desired bearing and at a uniform altitude, and the Committee is encouraging such training at Cambridge, where a special flight of the R.A.F. has been experimenting in order to find what standards of straight flying may be expected in the future. It is also hoped to develop a gyroscopic rudder-control which will assist the pilot to hold his course. The report emphasizes that uniform flying is essential, not only for vertical photography, but also for the satisfactory taking of oblique views, for without it the waste of time and money occasioned by a return to fill in gaps may be very serious.

The Committee does not advocate, in times of peace, any extension of mapping by air-photographs far beyond the limits of a system of ground control, but since it is recognized that, as a war measure, such extensions are sure to become necessary, the investigation and development of such aerial control as may be possible has been undertaken.

In contrasting the uses of vertical and oblique photographs it is pointed out that the vertical show more plainly and directly the features of all reasonably flat ground, and that they form convenient records which can be easily reduced to an exact map by the addition of suitable ground control at any future date. Oblique photographs are required before such a map can be contoured, and these also supply the means of extending any existing ground control by a system of aerial triangulation, but the view of the Committee is that the position of the exposure in space is best found from the control points shown on the vertical plate, and that this plate too, in preference to obliques, should be used for all photographic detail.

With this outlook the Committee combines a full appreciation of the necessity for reasonable simplicity and for speed in office work, and as a consequence it is natural, but none the less satisfactory, to find that the instruments which are being developed under its auspices involve none of the long and tedious calculations nor the very complicated mechanism necessary for some of the continental solutions of the problem of aerial mapping.

Of these new British instruments the two most important are the multiple-lens camera and Major M. N. MacLeod's tilt-finder. The first consists of a single camera constructed to take "five views, of which the central looks vertically downwards and provides the data from which to arrive at the point in space at which the exposure was made; the other four, with axes inclined at 14° to the horizon, acts as a theodolite, to define horizontal and vertical angular measurements." All four views appear on one plate, the obliques being arranged round the edges of the central vertical photograph. The lenses are all so fitted as to have their axes vertical, but mirrors are placed in front of four of them so as to produce the four different inclined views.

It is hoped that the tilt-finder, which is still in an experimental state, will make it possible to determine, from the ground control points which will appear on the "vertical" negative, the position of the exposure in space and the tilt of this negative, while the oblique plates will be measured up by means of the photogoniometer, or some similar instrument, so as to obtain the vertical and horizontal angles to all points which may be needed for contours or to form such an extended aerial control as may be required.

The tilt-finder can perhaps be most readily described as a mechanical

apparatus for visually "rectifying" the plate, so arranged that the coincidence which is obtained between the first control point on the plotted sheet and its image on the plate is not disturbed during the adjustment necessary to obtain a similar coincidence for the second control point, while these two coincidences again remain undisturbed by the manipulation which brings the third control point into coincidence with its image. When the plate and the plotted sheet have thus been set in their proper relative positions, an instrument known as a perpendicular indicator is employed to define the map position of the aerial camera. It is hoped that Major MacLeod's apparatus will make it possible to obtain results, on a scale of 1 : 10,000, which will not be in error by more than 10 metres in vertical height, 5 metres in horizontal position, and 10′ of arc in the angle of tilt. A gyroscopic tilt-recorder has also been devised and has been found to give results correct to within 15′, provided that the aeroplane is flying on a sensibly straight course. Such an instrument would at once give an approximate setting for the tilt-finder and would materially reduce the time required for the exact adjustment of the latter instrument.

The problem of the gyroscopic stabilization of the camera is dismissed as impracticable owing to the weight involved, and while it is admitted that the optical parts might be so stabilized, it is considered that the necessary optical system would be inconveniently complicated.

A further instrument essential to the method which the committee proposes to employ, the photogoniometer, is already in use in those stereoscopic methods which are described by Colonel H. St. J. L. Winterbotham, C.M.G., D.S.O., in the March number of the *Royal Engineers Journal*. The photogoniometer, which was first designed by Porro of Milan and afterwards further developed by Koppe, consists of an arrangement in which the plate is set behind the lens used in the field-camera (or another lens of similar optical properties) at the principal distance characteristic of that camera, and is examined through the lens by means of a small theodolite whose axes of rotation pass through the front node of the camera lens. Thus, provided that the plate is set at the correct tilt, the horizontal and vertical angles to any point in the photograph can be read off directly in the theodolite.

In order to complete the work of the multiple-lens camera, a satisfactory photographic rectifying apparatus is necessary, not for the inclined plates, which it is proposed to use only for those particular points which will be measured up with the photogoniometer, but in order to rectify the comparatively slight accidental tilts of the "vertical" plates. As the solution of this problem is complicated by the focal lengths of both the field and projecting lenses, the Committee is investigating the matter theoretically before proceeding to the design of a rectifying camera.

The report then proceeds to describe the method which M. Roussilhe, late Ingénieur Hydrographe-en-chef de la Marine, has introduced for the aerial survey of the devastated regions of North-Eastern France for cadastral purposes. It is based on a ground control so complete as to ensure that the images of three control points will appear in each negative. The aeroplane carries three cameras arranged, one with its axis vertical, another with its axis inclined forward at an angle of 30° with the vertical, and the third at a similar inclination on one side. The exposures are made during a series of straight parallel flights so arranged as to cover the whole area and provide the necessary overlaps. The success of the method depends on the satisfactory working of the rectifying apparatus, which is used first to discover the

elements (tilt, axis of tilt, and altitude) of the aerial photographs and afterwards to produce rectified images. M. Roussilhe employs a rectifying camera in which the plate-holder, lens and screen can each be revolved about its horizontal axis, while the plate can also be rotated in its own plane in the plate-holder. He claims that by the use of a definite method of procedure it is possible to obtain coincidence of all the three control points in about twenty-five minutes for each negative, and that the errors in the height of the aeroplane and in the position of the map plumb point should not exceed 10 metres, while the tilt can be determined to within 30′ of arc. It is also noted that differences of level of less than 100 metres do not produce appreciable distortion on the rectified print, when working on a scale of 1/5,000.

The publication of a full report of M. Roussilhe's work during 1923 will be awaited with interest, for as yet it is impossible to compare the cost of this method of air-survey with that of a similar cadastral survey made on the ground. It is admitted that some field-work will be required in broken ground and in order to clear up difficulties in the interpretation of the photographs, but experiments made in Egypt by the R.A.F. would suggest that the points which will require investigation on the ground may be very numerous. In North-Eastern France the aerial photographs should be free from the indeterminable boundaries such as are produced by English hedges and their shadows, but in the open agricultural land of Egypt it was found that while quite small holdings often showed apparent subdivisions due to the method of planting, continuous crops so frequently transgressed the property boundaries as to increase the necessary field-checking to an impossible degree.

The German automatic stereoscopic methods of air survey are also dealt with in the report, but are more fully described in Colonel Winterbotham's article in the *Royal Engineers Journal*, where he regards the subject primarily from the military standpoint. Colonel Winterbotham states plainly, and it is emphasized in the Report, that uniform flying over enemy territory and vertical photography such as was possible in Palestine in 1917–18 cannot be counted on in any future war. Consequently it may at any time become a military necessity to obtain the maximum information from a pair or more of photographs, lucky snap-shots over the enemy's lines, and it is under such circumstances that stereoscopic methods may become of great importance. Under war conditions also the need of speed would overbear all questions of cost, and consequently automatic plotting by means of either the autocartograph of Heyde or Zeiss's stereoplanigraph might well be of the greatest value.

But, for use in peace time, the size, the prime cost, and the complexity of both would appear to rule out these instruments, for according to Colonel Winterbotham the cost of the autocartograph is about £4500, and it may weigh anything up to three tons, while the stereoplanigraph is likely to be little cheaper or less cumbersome.

In principle both instruments depend on the application of photogoniometres, or of an analogous arrangement of lenses, to a pair of overlapping aerial photographs and the stereoscopic combination of the results. Photographs have been taken in England with one of Prof. Hugershoff's cameras, from which, by means of the autocartograph, he afterwards plotted a map with results which, considering the data supplied to him, were reasonably successful, but both Colonel Winterbotham and the Air Survey Committee agree that the photographs, which were taken through a wide-angle lens

and at the large angle of tilt of 60° with the object of covering a large area, failed to give satisfactory definition except in the foreground. It is noted that in air-photography both the unavoidable vibration of the aeroplane and also its speed during the exposure tend to destroy that sharpness of the negative which is so necessary where stereoscopic treatment is employed, and which, in groundwork, can be obtained with such comparative ease. The report further points out that, while on the ground one of the chief advantages of stereoscopic method lies in the facility with which the same object can be identified in two successive views, in the air such identification is seldom difficult even in views taken from very different points. Consequently why, except under very special conditions, should intersections in the air be confined to comparatively narrow angles of some 15°, which, even when assisted by the stereoscopic sense of those individuals in whom it is most developed, can hardly be held to exceed in accuracy intersections of between 45° and 135° such as can normally be obtained without difficulty in the air?

The second section of chapter v. of the Report contains a most valuable exposition of the Committee's views as to the respective utilities of the different methods of air survey. It states definitely that at present the method of vertical photographs with a strong ground control is to be preferred for most special and comparatively small surveys, the great majority of which must deal with ground which is sensibly flat; for it is seldom that mountainous country is sufficiently valuable to justify the cost of an elaborate survey. The "vertical" method involves the purchase of no expensive rectifying or plotting apparatus, and is thus particularly suited to the smaller surveys, but at the same time it makes the greatest demand on the skill and training of the pilot, for it needs a straight course at a uniform altitude and, if rectification is to be avoided, sensibly vertical photographs.

The air survey of the Nile valley, which is mentioned in that section of the Report which deals with cost but which, owing to its very special conditions, is precluded from giving any reliable guide, forms a good example of the use which can be made, for a particular purpose, of strips of vertical and unrectified photographs in connection with ground control. The problem was to obtain records of the limits of high and low Nile which could be readily compared with similar records for succeeding years. The periods during which the records could be made were therefore limited, while the time to be consumed in office work was comparatively immaterial. Although the Nile changes its course considerably from season to season, it seldom passes outside the artificial "Nile banks" which follow the course of the river on either side, and whose positions have been accurately surveyed. Consequently a long but narrow frame existed into which the series of air-photographs could be readily fitted, and questions of distortion and of change of scale became of minimum importance. In this instance aerial photography produced a satisfactory result where ground work would have required the employment of so considerable a body of surveyors for so limited a period that it would probably never have been attempted.

While the Report contains the refutation of much popular error as to the ease and cheapness of aerial mapping and the accuracy which has so far been obtained, the very circumstance of its compilation by experts for the information of those who have already some familiarity with the subject causes the omission of one point which many of those who have no practical experience of the use of aerial photographs, and of the maps prepared from them, are in great danger of forgetting.

An aerial map is often prettier than one made on the ground, it may appear to show more elaborate detail, the shapes of objects—especially of natural objects—are frequently more exactly represented, and in the near future, at any rate, there is every reason to suppose that it will be possible to increase the positional accuracy to whatever degree is demanded by the purposes of the map. But while aerial maps will doubtless prove the best obtainable for flying purposes and will serve admirably for artillery work and for any other purposes which depend more on the position than on the condition of surface features, they can never, save by the addition of much expensive ground checking, give as much useful information to the humble pedestrian, the exploring motorist or the inquisitive traveller, as can a comparatively rough ground survey.

Consequently the future of air survey seems properly to lie in those areas, whether of swamp, forest, or enemy country, which are largely inaccessible to the ground surveyor, and in the preparation of preliminary maps of undeveloped areas which can afterwards be amplified in many necessary details by means of ground work. G. S. L. C.

REVIEWS

EUROPE

East of Prague.— C. J. C. Street. London: Geoffrey Bles. 1924. $8\frac{1}{2} \times 5\frac{1}{2}$ pp. xvi + 288. *Illustrations and Map.* 10*s.* 6*d. net.*

In this book Mr. Street describes the economic and political conditions of Czechoslovakia, as he saw them in a recent tour by road and railway from Prague through Bohemia and Moravia to Bratislava; thence through Slovakia by the Tatra and down the Hernad valley to Košice; and on to Uzhorod and the further confines of Ruthenia. The book is mainly descriptive and carries the reader easily along the road with a pleasant discursive style which conveys much of interest, and gives a good picture of the life of the country. In many parts the author was well off the beaten track, which adds to the value of his book. In particular his chapters on Ruthenia are welcome as presenting vividly the difficult problems that face the government of Czechoslovakia in granting the promised autonomy within the state to this small number of scattered and barely educated people. Mr. Street has succeeded in his aim of giving a picture of modern Czechoslovakia and the growing success of her struggles to consolidate and unify the state in face of physical and racial difficulties. He has produced a book that merits attention. A better map would not be amiss. R. N. R. B.

The Experiences of a Military Attaché in the Balkans.— Lt.-Col. the Hon. H. D. Napier, C.M.G. London: Drane's. N.D. 10 × 6, pp. 293. *Portraits and Map.* 21*s. net.*

This is a belated war book, but Balkan problems are always with us, so that its tardy appearance does not militate against its interest. Lt.-Col. Napier had behind him a long service as military attaché in various capitals when he was reappointed to Sofia in August 1914. He remained there until Bulgaria joined the Central Powers in October 1915, when he was transferred to Athens. On his way to England two months later Lt.-Col. Napier was captured by a German submarine and held prisoner in Austria. Eventually he was exchanged, and returned home to work in London for a time, but went out again at the end of 1918 to Sofia, where he remained for five months.

The greater part of the book is in the form of a diary which in a story of this nature has the advantage of keeping the chronological sequence of events clearly before the reader's mind. Lt.-Col. Napier tried his best to bring Bulgaria to the side of the Allies, but Bulgaria's fear of Russia and Russian domination of the Dardanelles helped Germany's overtures, which were strengthened by Serbia's refusal to yield any territory in Macedonia. The book is mainly political, but it has a geographical value in showing that the crux of Balkan politics is Macedonia, which physical circumstances have made valuable to all Balkan peoples. It also shows the importance that an outlet to the Ægean Sea has to the Bulgarians, and the significance of this in the economic development of that country. This argument could have been made clearer by more insistence on the geographical aspects of the problem and the provision of a better map.

Italian Mountain Geology. Part III.: Central and Southern Italy.— C. S. du Riche Preller. London: Wheldon & Wesley. 1923. 9 × 5½, pp. 162. 3 *Photographic Plates*, 15 *Maps and Sections.* *12s. 6d. net.*

Excepting only the Gran Sasso, the mountain groups dealt with by Dr. Preller are all volcanic. They include the Alban Hills and South Etruria (round Lakes Bracciano and Bolsena), the isolated cones of Roccamonfina and Mte Vulture, the Naples group, and Etna. All important stages in the growth and decay of volcanic cones find illustration in these groups, and any traveller visiting Italy to study volcanoes will find this a useful guide, though unfortunately a little large for the pocket. It contains sketch-maps and full information on the structure, petrology, and historical record of each mountain. The plates are photographs of three of the beautiful series of relief models prepared by the Italian Geological Survey—a general model of the Naples group, and two of the Phlegræan Fields and Ischia on a larger scale. A. M. D.

ASIA

China: Yesterday and To-day.— Edward Thomas Williams. London: George G. Harrap & Co. [1924.] 8½ × 5½, pp. xviii. + 613. *Illustrations.* *15s. net.*

Mr. Williams, now Agassiz Professor of Oriental languages and literature in the University of California, was at one time American Chargé d'Affaires at Peking, and the present volume is the outcome of experiences and observation during thirty-five years' association with Chinese affairs at home and abroad. Its main object is to describe the China of yesterday as contrasted with the China of to-day, and the result is a work of unusual interest and suggestiveness, which not only gives an excellent picture of the country and its people, but presents the perplexing problem of present-day conditions and the movements of which they are the consequences from a standpoint not quite familiar to English readers—that of the intelligent American writer who is both a warm admirer of the part played by his own country in Chinese affairs and a frank critic of that of Great Britain.

The difficulties that confront the student of the people and politics of China to-day are illustrated by the question with which the book opens, "What is China?" This question was asked at the Washington Conference on the limitation of armaments: "It was not answered. An attempt to do so would have provoked a controversy." This statement clearly refers to the writer's view that the wish of Great Britain to become the protector of Tibet, against China's claim to sovereign power in that country, is only a prior step

to actual control, as, he states, was the case with Sikkim, Nepal, and Bhutan; and it serves to illustrate the author's attitude to British diplomacy.

The magnitude of the task of describing what is commonly called "China" may be imagined when one remembers that it covers an area of over four million square miles and comprises a population of perhaps four hundred million people. The remarkable civilization developed during centuries of virtual seclusion, China imposed on all those lesser neighbouring states with whom intercourse was possible. Siam, Annam, Japan, and Korea derived almost the whole of their arts and institutions from her (a fact which at once impresses itself upon Europeans dwelling there), and the less civilized Manchus, Mongols, Turkis, and Tibetans were also her pupils.

With every variety of soil and climate, her agricultural products were more varied than those of any other land, and being equally rich in animal and mineral resources, she had raw materials for every kind of manufacture and has given the world some of its most important industries. These features and their implications are admirably set forth by Mr. Williams and constitute a valuable part of the volume. A clearer understanding of them would have saved from ill-considered prophecy those writers who have somewhat hastily foretold the immediate and complete "Break up" and "Partition" of China.

The present social, and still more the political, transformation taking place in China is the result of a struggle between the two great civilizations of the East and the West. In order to describe this struggle and its meaning the author gives a deeply interesting review of the intercourse that China has had with the various nations of the West during the past two thousand years, and this forms in some respects, perhaps, the most valuable and illuminating portion of the book. Besides tracing early Greek influence on Chinese art through India, the author reminds us that commerce with Rome was known to the elder Pliny (who speaks of the furs, silk, and iron brought thither from China, through Parthian merchants), and that as early as 300 A.D. the Arabs were trading with the Chinese, from headquarters at Canton. Unfamiliar facts are related as to the early intercourse with Japan and the missions bearing tribute to the Chinese Emperor from the "dwarf kingdom." The author, however, falls into a strange mistake in stating that St. Francis Xavier gained "remarkable success" as the pioneer Christian missionary in Japan. As a matter of fact, much as he "delighted" in its people, he left that country a disappointed man, and the success he sought was reserved for his successors.

Excellent chapters are devoted to outlines of Confucianism, Taoism, and Buddhism, and the latter should be read in connection with the lucid and fascinating account given in Lord Ronaldshay's book 'The Lands of the Thunderbolt.' The daily life and occupations of the Chinese people are sketched in chapters of quite absorbing interest, but it is impossible now to dwell upon the later sections dealing with the kaleidoscopic political changes and the chaotic conditions to which they have so far led. In spite of all that is distressing in the present situation, there is hope in the fact that "The Chinese people are still there. *They* are the real strength of the country. They are industrious and law-abiding." The chaos and strife are not universal, and Mr. Williams maintains that "eventually the common sense of the common people will bring to an end the foolish factional strife . . . and national welfare will supplant personal ambitions." W. W.

Siberia's Untouched Treasure: Its Future Rôle in the World.— G. F. Fairfax Channing. New York and London: G. P. Putnam's Sons. 1923. 9 × 6, pp. xxv. + 475. *Illustrations and Maps.* 30*s. net.*

Even if the use of the term "Siberia" is allowed for the whole of Asiatic Russia, the title of this book is misleading. More than a third is occupied with an account of the writer's experiences with the American army in eastern Siberia in 1919–20. In this part the personal note is much in evidence, and there are, in addition to the portrait of the author, full-page plates of his military decorations. Of the rest of the book about 100 pages are devoted to pious platitudes on the evils of war, the hope of universal peace, and America's example to the world; and about 150 pages to an account of Siberia's resources, incomplete, far from accurate, and dealing mainly with the Amur region and Sakhalin. It is clear that in spite of his avowed attempt to gather "every possible source of information" the author was ill-equipped for his task. To begin with, he uses a Mercator map to illustrate the extent of Siberia, thus exaggerating its area. He eulogizes the climate of Siberia, "in all respects like that of the United States," citing merely the temperatures of July, saying nothing of the length of the Siberian winter, and disposing of the low winter temperatures as "grossly exaggerated." He writes as if latitude alone decided climate, and reminds us that "Vladivostok has the same latitude as New York, Spain, and the Mediterranean," the inference being that all have the same climate. "Blagoveshchensk and Omsk have considerably higher year-around temperatures" than London (p. 326). "The world knows little of such surprising facts." We agree. Evidently climate is not the author's special study. The Amur river is hardly 3000 miles long even if head streams are included, and so cannot be navigable for 8541 miles (p. 328). The "Ob-Yenisei" waterway may exist on the map, but facts are ignored when the author implies the possibility of through navigation from Irbit to Kyakhta. A little knowledge of Siberia would have saved him from that mistake. The natives of Siberia are mentioned only as "good workers, hospitable, and not knowing the value of money, their labour is cheap." The railway map is incomplete, and the town map includes Ust Yansk with thirty houses and omits Novo-Nikolaevsk with over 60,000 inhabitants, Tyumen, Barnaul, and Biisk. The author seems to think that Kamchatka is devoted to "prisons," and that the "exile mines" are or were in the Taimir peninsula. The chapters on timber are fairly full, but those on minerals are less satisfactory. Owing to the lack of system in the orthography it is impossible to locate on an atlas the various coal deposits enumerated: the map provided is merely an outline sketch. The chapter on Sakhalin coal (Pilevo river) reads like a company prospectus. In fact, Mr. Channing would seem to see in Siberia merely a land for exploitation: "Siberia stands to-day rich, unsettled, and unexploited—as did our United States, now vast and glorious, a century or more ago": but he has no constructive policy to offer. Many valuable books have been written on various parts of Siberia, but Mr. Channing appears to have discovered only "a scant dozen of writers and lecturers" on the country. These he condemns for giving a false picture of Siberia, eulogizing as the only writer who tells the truth Mr. Stefansson, who we believe claims no personal knowledge of Siberia. Evidently his disapproval is not extended to the Admiralty 'Handbook of Siberia and Arctic Russia,' vol. 1 (prepared by the Naval Intelligence Department, and published by H.M. Stationery Office). He makes no mention of this book, but clearly it has been of use to him. His chapter on

the history of Siberia's discovery and settlement, and an appendix on time, calendar, money, weights and measures, have been copied verbatim (errors included), *without a word of acknowledgment*, from this book. Thus the author falsely gives himself credit for the only scholarly chapter in an unsatisfactory book. R. N. R. B.

Tales from Turkistan.— Stor Løb. Edinburgh and London: William Blackwood & Sons. 1924. 7½ × 5, pp. x. + 307. *Two Illustrations.* 6*s. net.*

The author writes under a *nom de plume*, but it is not difficult to recognize in him Major L. V. S. Blacker, whose paper read before the Society in 1921 (*Journal*, Vol. 58, pp. 178 *et seq.*) covered in part the same ground. Few officers can have served in so many war areas so widely separated from one another as Major Blacker and his gallant contingent of the "Guides," and after a perusal of this work the armchair critic, who cursed the "side-show," would perhaps be ready to allow that the tiny force employed was able to carry out important military work that was out of all proportion to its size and cost.

To take the thrilling pursuit of the fifteen Afghans across unmapped mountains, where the cold was great and where rations were very short, until they were finally run to ground and seized in a caravanserai at Yarkand, not only are the finest qualities of British leadership displayed, but important results were secured with a tiny expenditure of force. Again, on the north-east frontier of Persia, what splendid work was done by the same gallant band, and how much loss of life and property was escaped by the Persians through the British operations! Moreover, every opportunity was taken to add to the geographical knowledge of the countries that were visited. Major Blacker has studied Persian history, but in his account of a visit to the forbidden fortress of Kalat-i-Nadiri, he makes a slip in stating that Nadir Shah, whose fastness and treasure-house it was, came of a Kurdish line. Actually he was of Afshar, and therefore of Turkish, descent, and so cannot be claimed as belonging to the Aryans, about whom the author waxes eloquent throughout his book. This does not a whit detract from a most graphic account of a natural fortress, which is probably unmatched in the world, and which struck the reviewer with awe when he visited it. Altogether we have a collection of thrilling stories of peril and adventure by land and sea, and it is to be hoped that they will be advertised as especially suitable for boys and girls, for such deeds must never be forgotten, as they enrich the annals of our race and also the records of our Nordic brethren in the Panjab.

One has often wondered how our descendants will compare the great deeds of the World War with those done by the heroes of the Elizabethan era. The leaders in those days were as brave as lions, permeated with pride of race, and did great things, but the men they led were, in some cases, cowardly, owing to the superstitions of the period and also lack of spirit. Will not the verdict be that the British officer of the World War was enabled to do deeds that can never be surpassed, partly owing to his own spirit, but also owing to the splendid quality of the men he led? In any case a great tribute for valour is surely due to those unconquerable Indian troops who fought with success in every war area, and who covered themselves and the "Guides" with undying fame in the expeditions here narrated. P. M. S.

AFRICA

Reise durch Kusch und Habesch.— Eduard, Freiherr von Callot. Bearbeitet von F. Bieber. (Sonderabdruck aus L. Frobenius "Afrikanisches

Heldentum," Bd. I.) Stuttgart: Union Deutsche Verlagsgesellschaft. 1923. 8 × 5, pp. 200.

The editor has done well to republish the account of Edward von Callot's half-forgotten journey from Egypt through the Nilotic Sudan to Abyssinia, both because the scientific value of the expedition was considerable, and also because it is a very readable book. So many books of travel are dull and weary reading with their interminable strings of facts relating to marching stages, climatic conditions, or trivial incidents of the journey: not so Von Callot, or Arslan Bey as he called himself. After an adventurous life in Europe as a professional soldier or mercenary, he drifted out to Egypt by way of Constantinople and the Levant, in the service of Muhammad Ali. In 1831 he was sent by the latter on a mission to Abyssinia, which he saw during the days of King John, when, though already at the beginning of its decay, Ethiopia of the King of Kings was still surrounded by the glamour of greatness and the romance of Christianity in Darkest Africa.

Von Callot has a pleasing style of writing. He intersperses his brief notes of the route with excellent descriptions of the places he saw and the amusing incidents he encountered. Being a shrewd observer of detail his account of the Nilotic Sudan and of Abyssinia is of considerable historical importance, and it is perhaps from this point of view more than as a purely geographical work that this book is to be recommended.

He mentions, for instance, that Ras el Khartum, in his day only a small group of huts at the junction of the Blue and White Niles, is perhaps the most important strategic point in Eastern Africa, for it is here that the roads from the Nile Valley to Abyssinia, Equatoria, West Africa, and the Congo meet. He recommended to his royal master that the place should be securely held, and prophesied for it a great future. The Sudan indeed appeared to him so valuable that in a private letter to a friend he expressed the hope that his own country, Austria, would come and occupy it. Sometimes, of course, his appreciation of the picturesque leads him into telling "tall" stories, like that of his camels being attacked by hyænas and pulled down, or of the presence of tigers in Eastern Africa.

Von Callot deserves to have his memory kept green as a remarkable traveller—in Arabia and the Levant, apparently, as well as in Africa. His book was originally published in 1855, but is difficult to secure. It was written while he was imprisoned in a fortress in Austria as a result of the rather too active political interests which he displayed on his return to Europe. One regrets that in this new edition of a part of his works the editor did not compile an index or prepare even a sketch-map in the place of the hundred years' retrospect with which the volume terminates. For a book of scientific value in other countries besides Germany, the use of Gothic type in the printing is to be deprecated. F. R.

Le Myre de Vilers—Duchesne—Galliéni. Quarante Années de l'Histoire de Madagascar, 1880-1920.— G. Grandidier. Paris: 1924. 10 × 6½. *Illustrations and Maps.* 24 *francs.*

The connection of France with Madagascar dates from the seventeenth century. Both Richelieu and Colbert in turn had in view the extension of French colonial enterprise in the Indian Ocean. But the attractions of India, with its rich commerce and wide field for imperialist adventure, proved superior to those of a land where people were primitive and whose resources were undeveloped, and though Madagascar remained a French sphere of influence, to use a later term, French colonization made little progress and

the connection of the island with France was of a restricted and shadowy character. There were always doubts in France as to whether the island was worth the considerable effort and expense of conquest and colonization. But in the period of active colonial expansion which followed the downfall of the second empire and the failure of French policy in Europe these doubts were finally resolved and the island was made a French colony. It is with this development that this book is concerned. It relates the story of the dispute which began in 1880 over a transfer of land to a French Catholic mission; of the Treaty of 1885 with its obscure settlement of the fundamental question of French control over the foreign policy of the Madagascar Government, of the breakdown of the Protectorate, the war of 1895, the conquest of the Hovas, the definite annexation of the island in 1896, and the subsequent dethronement of the queen. It was to General Galliéni, afterwards famous as the defender of Paris, who was returning from his success in Indo-China, that was entrusted in 1896 the pacification of the country and the organization of its government and administration. He abolished the monarchy and the Hova government, reduced the rebellious tribes, constructed roads through the country, and consolidated French rule. His difficult task, carried out with firmness and conciliation, won him the good-will of the people and the gratitude of France, proud to have added so fine a possession to her extensive African dominions. The book is illustrated by two maps—one of Madagascar, and the other of the central province, Imerina, as it was at the time of the conquest—and by portraits of the leading persons in the story, Queen Ranavalona III. and her Prime Minister, the Resident Le Myre de Vilers, General Duchesne, and General Galliéni. E. A. B.

Through Nigeria to Lake Chad.— **F. W. H. Migeod.** London: Heath Cranton. 1924. 9 × 5½, pp. 330. *Illustrations and* 2 *Maps.* 30*s. net.*

In his latest book Mr. Migeod describes a journey up the Niger and Benue rivers to Bornu and Lake Chad, whence he returned westwards to rail-head at Kano. The principal object of the journey was "to make ethnological studies, especially in regard to the movements of tribes caused by the desiccation of the country."

In every town and village he visited he appears to have made diligent inquiries into tribal history and traditions, and he has been able to record at first hand a great deal of information which hitherto has not been easily accessible. The chapters on Dikoa and Ngala and the account of his inquiries concerning the mysterious So people are particularly interesting. As may be expected of this author the present volume contains valuable notes on the languages of Bornu. The results of his investigations into the problem of desiccation have already been published in this *Journal.* That the Sahara is encroaching on the Sudan is no longer disputed. Mr. Migeod's study of tribal movements arising from increasing aridity are particularly valuable. It is difficult, however, to accept his statement (p. 198) that desiccation has been going on from Roman times. He has in mind, no doubt, the Roman aqueducts in the northern Sahara. Their presence there would seem merely to indicate that areas which were reclaimed by Roman irrigation engineers reverted to their former desert state on the fall of the empire and the consequent decay of aqueducts. Similarly there seems to be insufficient evidence that desiccation played a part in driving the Kanembu into Bornu at the end of the fifteenth century, as Mr. Migeod thinks (p. 99). There are certainly well-authenticated cases of peoples of this region being driven south in the past by desiccation, as for example the Gobirawa from Aïr, but it is necessary to bear in mind

that there is much evidence in the Western Sudan that desert conditions once prevailed far south of the present southern limit of the Sahara. We do not yet know when the present period of increasing aridity commenced.

Mr. Migeod gives interesting photographs of the ruins of Gambaru. These ruins are the only example in the Western Sudan of the use of burnt bricks, and their origin has therefore excited much curiosity. Mr. Migeod suggests the brickmakers came from Tripoli. It is recorded, however, that a sultan of Wadai, which lies to the east of Lake Chad, once sent to Egypt for a man to make burnt bricks, and his handiwork may still be seen in Abeshr, the capital of the country. The bricks of Gambaru may be the work of the same craftsman, or of one of his pupils. Mr. Migeod's statement (p. 59) that the rectangular buildings of Bornu "represent the advent of a higher civilization introduced when the Fulbe accepted Islam" would seem to need some qualification.

Mr. Migeod served for many years in the Gold Coast Colony, and he appears to have been much interested in the very different methods of administration employed in Nigeria. His opinion that the natives should be made to learn English will not command general sympathy, but is of interest, for it approaches to the French view that the Europeanization of the native is the goal to be aimed at, which is in direct opposition to Nigerian principles of indirect administration. The reader will learn with surprise of the line adopted by the governor of French Cameroons in recommending to Fulani chiefs the drinking of champagne.

In spite of the criticisms of his last book Mr. Migeod continues to write in diary form, a method which he defends in his preface. It certainly enables him to introduce a great amount of miscellaneous information into the text and gives his narrative a certain value as a route report, though in this respect its value is impaired by the fact that he performs a great part of his daily marches in hours of darkness. This would matter less if the book were well provided with maps. Unfortunately it contains only two small-scale maps so roughly executed that many of the names are almost, and some quite, illegible. A junior pupil at the Kano Survey School, whose work he admired so much, would have been well able to produce for him an excellent sketch-map which would have added to the value of an interesting book. It is to be hoped that Mr. Migeod will publish an account of his more recent travels in West Africa. E. W. B.

Life in Southern Nigeria. The Magic, Beliefs, and Customs of the Ibibio Tribe.— P. Amaury Talbot, Resident, Nigeria. London: Macmillan & Co. 1923. 9 × 6, pp. xvi. + 356. *Illustrations and Map.* 21*s. net.*

The dense forests and mangrove swamps which lie to the east of the Niger delta are inhabited by some of the most barbarous tribes in Africa. We are largely indebted to the work of Mr. P. Amaury Talbot for our knowledge of these people. Some years ago he wrote a book on the Ekoi which established his reputation as an anthropologist. In 1914 he read before this society a very interesting paper on the Ibibios, whose home lies between the Kwa-Ibo and Cross rivers. A little later Mrs. Talbot published an account of the women of the tribe, but owing to delay caused by the war Mr. Talbot's masterly study of the tribe has only recently left the printers' hands.

Mr. Talbot devotes a large part of his book to the fetishes or *jujus*, which are the controlling factor in the lives of the people. Up to only a very few years ago thousands of human lives used annually to be offered in sacrifice to the *jujus*. Although it is no longer easy to evade the vigilance of Govern-

ment, ghastly rites are still sometimes practised secretly in remote fastnesses of the bush. Mr. Talbot, then a district commissioner, took over the administration when human sacrifice was a daily occurrence and freshly killed human skulls were heaped before many of the shrines. In his previous work on the Ekoi he gave an interesting account of the powerful Egbo society which includes numbers of Ibibios among its members; while afterwards in their country he learnt more about the society, his most notable discovery being that although women are most rigidly excluded from all its rites, yet in origin it was a female society. The present book also includes an account of the Ekong society, the initiatory ceremonies of which are said to bear a strong resemblance to those of freemasonry. Disciples of Sir James Frazer will learn with interest of the discovery among the Ibibios of a tradition of "a priest who slew the slayer and himself must be slain."

Not the least pleasing feature of Mr. Talbot's book is his own modesty and the readiness with which he recognizes the assistance of others. Foremost amongst these he places that remarkable African, Chief Daniel Henshaw, through whom he was able to learn much which could otherwise never have reached his ears. Although several attempts were made on the author's life, his wife and her sister were his constant companions. The botanical work of these brave women has enhanced the value of both Mr. Talbot's books, besides having enriched the collections at South Kensington.

In his books on Southern Nigeria Mr. Talbot makes frequent reference to the occurrence there and in Egypt of identical customs and beliefs, giving his readers the impression that in spite of their occurrence in such widely separated regions he suspects a common origin. Perhaps some day he will develop this interesting theme.

The book is one which will make a strong appeal to students of anthropology, but it may also be recommended to the general reader, especially one who likes his flesh to creep. It is well illustrated with photographs, and includes a very good map. If one may be permitted a single criticism of an altogether admirable book it is that the spelling of place-names on the map frequently differs from that employed in the text. E. W. B.

AMERICA.

Alaska.— **Jeanette P. Nichols.**— Cleveland: The Arthur H. Clark Co. 1924. Pp. 456. *Maps and Portraits.* 6 *dollars.*

A great deal has been written on Alaska, especially in relation to gold and furs, while the early history of the country under Russian rule has not been neglected. But the author claims that she is the first to trace the political development of Alaska, which is the theme of her book. Not much more than half a century ago (1867) the United States purchased this huge domain for a sum which, as the author says, is less than half the present annual value of canned salmon which Alaska exports. For seventeen years it was under military rule and had no form of civil government. In 1884 a governor and a judge were appointed, but the law "failed to grant them means by which they could make themselves of use." The Klondyke gold rush brought the country into prominence in 1896, but not until 1909 did Alaska send a delegate to Congress. The time had come for a legislative assembly, but the influence of President Taft was thrown against it. It was not before 1912 that the bill was passed for an elective legislature. There would appear still to be room for political reforms before Alaska has complete self-government. Miss Nichols writes mainly of the events of the last twenty-five years, and tells graphically Alaska's struggle for home rule in the face of opposition from

Washington. Her criticisms are outspoken and by no means biassed in favour of United States policy, but she has spared no pains to arrive at the facts. The book is well documented throughout and provided with a useful map and complete index. It supplies an important chapter in the political history of the United States, and to a wider circle it will be of interest as illustrating the evolution of political ideas in a newly peopled land.

R. N. R. B.

Galapagos. World's End.— W. Beebe. New York and London: G. P. Putnam's Sons. 1924. Pp. xxii. + 443. *Sketch-maps, Coloured and Photographic Illustrations. £2 2s. net.*

The Galapagos Islands first came into prominence through Darwin's visit in 1835, and their importance has been due chiefly to the peculiarities of their fauna and flora. But the islands have a long and fascinating record as haunts of buccaneer and whaler, with tales of shipwreck and buried treasure and a chequered period as a penal colony and plantation settlement. From being vaguely a Spanish possession they became Ecuadorean in 1832, but it is only as a possible coaling station on Panama routes that the archipelago has come within the fringe of world politics. For a few semi-barren islands of limited economic value the Galapagos Islands ("Archipelago de Colon" officially since 1892) have an extensive literature in several languages, but there was still room for this fine volume.

Mr. Beebe records the visit of a collecting expedition sent by the New York Zoological Society. Although lack of coal and water for the boilers curtailed the cruise of the *Noma* to a few weeks in the island waters the expedition did a great deal of work, and Mr. Beebe, assisted in some chapters by Miss Ruth Rose, has produced a charming volume of field observations of the strange life of sea and land, including sea-lions, black lizards, iguanas, boobies, and other creatures. Of the famous giant tortoises only a single small specimen was seen. As regards the origin of the islands he finds no facts to contradict the belief in a former land bridge with the Central American mainland and a former single large Galapagos island subsequently separated by submergence into a number of separated peaks. He shows how the idea of the islands being oceanic in origin and receiving their flora and fauna by aerial and aquatic transport or even by the agency of migratory birds has little evidence in its favour. The plants show an overwhelming percentage of relationship with Central America, West Indian and Mexican species as compared with that with South America, which now is the nearest land; and "this same thing can be duplicated in almost every group of organisms on the islands." Finally, there are strong indications of a definite submarine plateau between the Galapagos and Central America, even if more soundings are required before this can definitely be established.

A long and interesting chapter by Miss Ruth Rose treats of the history of the islands. There is also a copious bibliography, to which might be added the 'Peace Handbook,' No. 140 of the Historical Section of the Foreign Office and some additional works therein quoted. The volume is beautifully illustrated with photographs and coloured plates; some of the latter are most striking, as, for instance, the four-foot iguana and the fishes of rainbow hues.

R. N. R. B.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

An Introduction to Oceanography.— James Johnstone, D.Sc. University Press of Liverpool. 1923. 9 × 5½, pp. xii. + 352. 15*s. net.*

Prof. Johnstone's new book is specially designed for students of geology and geography, and deals therefore exclusively with physical oceanography. In a book of this size it must be difficult to judge the amount of space which can fairly be allotted to the different subjects. In the present instance properties of the sea water and ocean currents are well and adequately treated; but on the other hand geologists at least will feel that considerably more might have been written on Bottom Deposits and considerably less on the Tides. The book, however, is sure to recommend itself to the geological reader by reason of the careful account of the origin of ocean basins The second chapter deals with this at length, and more particularly in terms of the planetesimal hypothesis. It is followed up by later chapters with numerous diagrams on the oceanic margins and secular changes in the oceans. These give the book a value quite apart from the fact that it is one of the few English text-books on oceanography. The planetesimal hypothesis may not be generally accepted, and geologists will no doubt considerably modify their views on palæogeography; but Prof. Johnstone has nevertheless done a service in providing students with a synopsis of the present-day ideas in convenient form. J. M. W.

POLITICAL AND HISTORICAL GEOGRAPHY

Politische Geographie von Friedrich Ratzel. Third edition, revised with additions by **Eugen Oberhummer.** Munich and Berlin: R. Oldenbourg. 1923. 9¾ × 7, pp. xvi. + 628. Paper covers, 16*s.*; bound, 18*s.*

Prof. Oberhummer tells us that in this edition the changes are comparatively few. It was otherwise in the second edition issued by the author himself in 1903 (six years after the first) with a sub-title '*die Geographie der Staaten, des Verkehres und des Krieges*,' which, says the present editor (p. 613), indicates the direction in which the original work had been extended. On undertaking the preparation of this posthumous edition it was from the first clear to the editor that a work of so personal a stamp could not be recast without having its individuality destroyed, and accordingly he felt himself restricted to such corrections, additions, and excisions as were necessary to make the text faithful to the present situation, and in all changes has done his best to distinguish between what is due to Ratzel and what to himself. All corrections, however trifling, and all additions to the body of the book are printed in italics, and a list of the omitted passages, nineteen in all, is given in the prefatory note.

The principal addition consists of an appendix of twenty-two pages in which Prof. Oberhummer gives a sketch of the history of political geography before Ratzel and its development down to the latest date. In this he claims that Ratzel is the creator of political geography as an independent branch of the general geography of man. The state as such was hardly ever a subject of consideration for ancient geographers, and a change of view was first due to the spirit of the renaissance. It is no accident that the word for state, derived from the Latin *status*, common to the languages of central and western Europe, acquired its present sense only in the fifteenth century (p. 599). In map-making Ortelius, so far as Prof. Oberhummer is aware, was the first to distinguish countries by surface colouring, a practice which he is surprised to find so largely followed in some countries even at the present day. In

literature he agrees with Peschel in claiming for Italian geographers the merit of having been the first to describe political conditions and civic institutions in the spirit of the Venetian ambassadors, and in this connection he attaches special importance to the works of Botero. Mention is made of the threefold division of geography by G. Sanson in his *Introduction à la Géographie* (Paris, 1681) into astronomical, natural, and historical. This last designation gradually gave place to political, but when the term "political geography" was first used Prof. Oberhummer has not been able to ascertain. It was used by Kant probably as early as 1757, but there is no reason to believe that it was originally his. Alex. v. Humboldt's *Essai politique sur le Royaume de la Nouvelle Espagne* (Paris, 1811) may be hailed as the first work in which the handling of statistical material was based on genuinely geographical study, but it was Ratzel who first assured for political geography by that name the separate place it now holds in geographical study.

The reception of the first edition of the *Politische Geographie*, especially by geographers, caused some disappointment to the author. It appealed more to students of political science, political economy, and sociology than to them. Geographers had a difficulty in deriving from it any sharply defined ideas and concrete results, and university students simply did not know what to make of it (pp. 612–13). But the subject gradually made way. Geographers who were at first opposed to Ratzel's conception of the subject came to be the authors of books on it (Supan, Schlüter), and the events of the war and the peace have done more than anything else to spread interest in the subject. The general index to the work has been prepared on a new and more useful plan, and a new index of authors (those referred to solely in the new matter distinguished by italics) has been added. G. G. C.

A Map of the World designed by Gio. Matteo Contarini, engraved by Fran. Roselli, 1506. Printed by order of the Trustees, sold at the British Museum, etc. London, 1924. $13\frac{1}{2} \times 10$, pp. 15. *With facsimile.* 3*s. net.*

The Trustees of the British Museum have done a service to students and set an excellent example to other owners of rare maps by their prompt issue of a full-sized facsimile, produced by the collotype process, of the unique Contarini map lately acquired by the Museum, and described in the *Journal* for October 1923. The account there given was avowedly general and provisional, and the reduced facsimile accompanying it could not serve the purposes of detailed study, many of the legends being with difficulty decipherable even on the map itself. The value of the letterpress accompanying the British Museum reproduction is not to be judged by the number of pages, for the amount of labour involved in the preparation of a complete list of the names and reproduction of the legends on the map can only be realized by those who have attempted the task of deciphering and interpreting the indistinct characters of such ancient documents. This has been the work of Mr. F. P. Sprent, Assistant Keeper in the Museum Map Department, who appears to have carried out his difficult task with unqualified success. In many cases the interpretation must have seemed all but hopeless, but in hardly a single one, if in any, has Mr. Sprent had to confess himself beaten, but even when parts of words or phrases are wholly missing, by comparison with other documents he has arrived at a solution which inspires our entire confidence. Perhaps the most striking instance is that of the town Pri[m]is [M]ag[n]a to the east of the Nile in 20° N., of which the letters supplied in brackets are entirely missing in the original, while the rest are far from

distinct. The town is placed by Ptolemy, under the above name, on the right bank of the Nile just above Meröe.

A brief introduction is supplied by Mr. de Villiers, giving just so much explanation of the circumstances in which the map was made and its relationship with other contemporary documents as is needed by the public for a proper understanding of the place it occupies in the history of map-making. Besides giving translations of the title and verses which explain the dual authorship, and of the various legends scattered about the map, Mr. Sprent has been at pains to give the modern equivalents of the places named, so far as is possible, except where the meaning is obvious. He also adds a few explanatory footnotes where necessary. The arrangement is alphabetical under the four continents, an aid to localization being given by mention of the latitude in which each is placed. This is perhaps the most convenient method which could have been devised.

The exceedingly moderate pricing of the reproduction will place it within the reach of a wide circle, and is another example that might oftener be followed.

GENERAL

This Earth of Ours.— Jean Henri Fabre. Translated by **Percy F. Bicknell.** London: T. Fisher-Unwin. 1923. 8½ × 5½, pp. x. + 339; 26 *figs.* 10*s.* 6*d. net.*

The object of this work is "to impart a little agreeable diversion to the unavoidable dryness of geography." Fifty years ago it might have fulfilled a useful purpose, but to-day it appears out of date both in matter and manner. Geography as now taught is no longer a dull subject, and the modern schoolboy and girl are apt to be impatient of the style in which the author addresses them. Such ideas as that the Earth has a thin solid crust resting on a molten interior (p. 94), that earthquakes are the causes of the upheaval of land (p. 112), or that the growth of coral is extremely slow (p. 302), along with the classification of mountains in thirteen ages of upheaval (p. 169) belong to that past generation in which it could be said that "no one has yet reached the North Pole" (p. 335). The translator tells us that he has as far as possible cut out passages that occur in the author's other works. Except for this he appears to have adhered to a literal translation, retaining even the leagues, metres, and degrees Centigrade which make it difficult for English readers to visualize the measurements given, and only permitting himself a footnote where some correction of the text seemed necessary—and in one case where it was not necessary, since Dolcoath is a famous Cornish mine and there was no need to surmise that "possibly Dalkeith, Scotland, is meant" (p. 89). The book however has the merits of its defects, for instead of giving us, as a more modern work might, accounts of the doings of Nansen or Scott, it tells us about Dumont d'Urville, and gives a full account of the earliest ascents of Mont Blanc and Mont Perdu—tales which may yet stir the blood even in this Everest period. A. M. D.

The Cruise of the "Amaryllis."— G. H. P. Muhlhauser, Lieut. R.N.R. London: John Lane. 1924. 7½ × 5, pp. xx. + 316. *Illustrations and Sketch-maps.* 8*s.* 6*d. net.*

The achievements of which this book is the record can rarely have been surpassed even in the annals of British seamanship. In the 37-ton yawl *Amaryllis* Lieut. Muhlhauser sailed round the world, a trip of 31,159 miles, in just under three years. This bald statement itself conveys some

idea of the man who could plan such a trip. In this account, condensed from his diaries, of his voyage from Plymouth, *viâ* the Panama Canal, to New Zealand and home across the Indian Ocean, the outline is filled in, unconsciously and indirectly, by himself. One great difficulty was the finding of a crew: Muhlhauser himself was the only man to complete the voyage. At various times his companions were a "French lad with a dash of colour," a San Blas Indian, a Niue islander, a Malay, and a Lascar, amongst others, most of whom proved indifferent sailors. The circumstances of the voyage, therefore, required him to be constantly alert, and to rely upon his own judgment. Fortunately the weather on the whole was fair: the Pacific was crossed from the Galapagos to Ua Kuka in the good time of twenty-six days. Nevertheless there were trying spells in the Malay Archipelago and the Arabian Sea. Ashore he was a keen and interested observer, and of every spot he visited he notes something of value. Why did he undertake such a voyage? He confesses his inability to answer this himself—"it is difficult to explain to those not drawn to the sea." At least, it is a "clean sport." Later he wrote in his diary, "Worry and expense sum it up; I suppose I like it, or I would not do it." His death, within a few months of his return, testified to the hardship and strain entailed by his last achievement.

THE MONTHLY RECORD

EUROPE

The Society.

THEIR Royal Highnesses the Duke of York and Prince Arthur of Connaught have been pleased to accept the request of the President and Council that they should become Honorary Members of the Society.

Ground-Relief and Settlement in the Baltic Lands.

Recent German research on the distribution of settlements over the south-east coastal region of the Baltic in early historic times is reviewed by H. Mortensen in the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, Nr. 3–4, 1924, and the results briefly set forth. In Samland it has been shown that, with the exception of the rocky, pebbly and precipitous portions, the hilly region was the site of the old and more dense settlements, while the more level regions, with undoubtedly better soil, were but thinly settled. This is explained by the greater dampness of the soil of the plains. The same condition is observable in Western Lithuania: here the *Hochzemaiten*, at the present day entirely unwooded, was settled in early historic times by the Letts, in contrast to the unsettled southern and western *Tiefzemaiten*. Apart from the more defensible nature of the Hochzemaiten, the better drainage conditions in the hills exercised an influence, for at present, while the Tiefzemaiten is widely and fragmentarily settled, the settlements are found preponderatingly on the "end-moraine" hills, avoiding the relatively moister "ground-moraine" plains, although the soil of the more level, wooded plains is much better. So close is this connection that a relief map of this region might almost be constructed from a map showing distribution of population. In north-east Lithuania, also in the region of the Baltic ridge between the Dvina and Malatij, the end-moraine hillocks, of gravel, rubble, and sand, are generally cultivated, while the more fertile but moister plains are covered with woods. For Latvia and Estonia the studies are less complete; yet it is noteworthy that the most thickly populated Kreis,

Illukst, lies upon the Baltic ridges. In Estonia the populated areas coincide with those marked on Kupffer's oro-hydrographical map as highlands. Similarly, in the Drumlin region north-west of Dorpat, and elsewhere, a physical relief map might be constructed from one showing the surface under cultivation. In all these instances, the melting of the snow plays a decisive part. Here the ground remains damp for a considerable period after it. The lighter soil will be ready in spring one and a half weeks earlier than the heavier, an important consideration where the period of cultivation is short. This is also an added advantage for the hills. Where the peasantry is backward, the difference is further increased. It is also observable that the connection between settlement and surface becomes closer from west to east, as also does the importance of the part played by the melting of the snow. The difference in the dampness of the soil need not be great to influence settlement. These considerations only enable one to distinguish regions which should apparently *not* be settled: the actual position of settlements must be determined on other grounds. Both in eastern Germany and in neighbouring regions, these surface factors would seem to take precedence over all other geographical correlations, such as sites on rivers and streams, the border of natural pasturage, etc.

A German Republic on the Volga.

A brief note on a German autonomous republic on the Volga is contained in the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1924, Nr. 3–4. At the beginning of the year the Autonomous Socialist Soviet Republic of the Germans of the Volga was proclaimed at Pokrovsk, and is now recognized as a federal unit of the Russian Soviet Federation. The "Wolgadeutsche Arbeitskommune" was originally founded in 1918, an early result of the application of self-determination. The German colonists were separated from the Governments of Saratov and Samara, and placed under an elected workers' committee. In 1920 the population of this German "enclave" numbered 453,000, of which 97 per cent. were German, and the remainder Russian. Marxstadt (formerly Katherinenstadt) was chosen as the capital, and the Russian civil code was adopted, except that German was the official language. In July 1922 the area of the republic was extended, at the expense of racial homogeneity. At the end of that year the Germans formed 67·4 per cent., Russians 21·3 per cent., and Ukranians 9·7 per cent. of the population. The three languages are now recognized, and the area has been divided up in fourteen Cantons on the basis of nationality, eleven German and three Russian. Pokrovsk is now the capital, and, as the point of departure of the railway to Orenburg and Astrakhan and the corn market, is also the economic centre.

AFRICA

South African Drought Problems.

The importance of drought to the affairs of South Africa is evident from a Drought Symposium which was held at Bloemfontein on 10 July 1923, during the meeting of the South African Association for the Advancement of Science. The papers then read appear in the *South African Journal of Science*, vol. **20**, No. 1, comprising a general *résumé* of the drought problem in the Union by R. J. van Reenen; discussions of conditions in the South-West Cape region by R. H. Compton, and in the Orange Free State by G. Potts; a note on the general question by J. W. Bews; another discussion on erosion effects in Southern Rhodesia by J. C. Jennings, and lastly, a representation by E. H. L. Schwarz of his well-known Kalahari project. All these

reports confirm what we have previously been led to understand, that it is not diminishing rainfall which is at the bottom of the mischief in the sub-continent, but the rate at which soil-erosion is proceeding through changes wrought in the vegetation-covering through human agency. Moreover, owing to the pernicious hydrological regimen connected with the relief of Africa in general, as demonstrated recently by Prof. Schwarz, coupled with the fact that the rainfall regimen of much of South Africa is one of summer thunderstorms, probably the most violent in the world, the country is peculiarly sensitive to the effect of human operations calculated to destroy the natural vegetation and reduce the efficiency of the rainfall through increasing the percentage of run-off and the rapidity of soil-erosion. Remedial measures are indicated in direction of anti-erosion works, afforestation, and education of the farmer, both white and black, in methods which will assist in stabilizing the flow of rivers. It is unfortunate that irrigation, so essential to South Africa, does not appear to have any great future, for Mr. Kanthack, Director of Irrigation for the Union, shows that the total irrigable area, actual and potential, is only about 1 per cent., and thus shatters the dream of those who think that South Africa is capable of being transformed into one great irrigated garden. Mr. Compton points to the mountain mists of the South-East Trade as a valuable potential source of water-supply in South Africa, and expresses astonishment that the experiments conducted some twenty years ago on Table Mountain by Dr. Marloth, who showed that enormous quantities of moisture were collected by the vegetation of the mountain from mist and fog, and by rain-gauges fitted with wire netting, should have been ignored. Hill fog or mountain mist is by its different mode of formation more wetting than nocturnal valley fog, and could no doubt by contact action be made to yield artificially considerable quantities of water which would go far to supplement the ordinary rainfall supply to storage reservoirs. Incidentally, it seems probable that a not inconsiderable fraction of the huge annual rainfall totals collected by gauges in the mountainous districts of the British Isles is contributed by hill fog, which is also considered by some (*e.g.* Mr. E. A. Martin: see *Journal*, vol. 34, pp. 174 *et seq.*) to be the determining factor in the maintenance of "dew-ponds" in the South Downs. Finally, the Congress last year urged the investigation by the Government of Prof. Schwarz's Kalahari scheme and expressed regret that the Drought Commission had not even referred to it in their Report. The scheme was explained to this Society by Prof. Schwarz himself at the end of 1920, and published in vol. 57 of the *Journal* (p. 166).

In explaining his scheme in the *South African Journal of Science*, after showing how much further a given quantity of rain will go in England than in the Karoo, where the ratio of rainfall to evaporation is so different, Prof. Schwarz says that "in the Fens, which are the wettest portion of England, the rainfall varies from 15 to 12 inches." As he then refers to "this area of exceptionally low rainfall" it may be assumed that "wettest" is meant to refer to soil moisture; but even so the correctness of the statement may be questioned, in view of the extensive drainage that has been carried out. And the fact is that neither in the Fens nor the even drier Essex marshes does the mean annual rainfall anywhere appreciably fall below 20 inches, a minimum amount which spread out over a large number of days in a moist cloudy climate gives a distinctly rainy character even to the driest parts of England.

AMERICA

Mountain Snowfall and the Floods of the Colorado.

The lower parts of the Colorado valley resemble Egypt in depending entirely on irrigation for possibilities of cultivation, and an abnormally high flood may do great damage by overtopping or breaking through the containing levees. Such floods are mainly the result of snow-melting in the mountains, and the amount of accumulation of snow has of course to be considered in any attempt to forecast the floods. The relation between the two phenomena is discussed by Mr. J. M. Sherier in the *Monthly Weather Review* for December 1923, on the basis of the observations made since 1911. The relation is not a direct and simple one, since flood-crests due to melting snow depend not only on the depth of the accumulation, but on the rate of melting, and a moderate accumulation may disappear so quickly as to cause alarmingly high stages, while much larger amounts may be melted gradually through the alternation of short warm periods with cooler weather, and so result in no alarming flood-crest. This is strikingly brought out by the figures given. There was a deficiency of snow on the ground at the end of March in seven years of the observation period, and in five of these the flood-crests at Yuma were also below the normal. But in 1914 the maximum stage was 2·1 feet above the average, and in 1921 the highest summer stage on record occurred, both these being years of deficient snow cover. In 1920, 1922, and 1923 excessive accumulations were recorded, but only in 1920 was the water unusually high. Thus forecasts based only on snow-depth would have been remarkable failures in the last three years. The high stage in 1921 was due to rainfall in the upper basin in March, when the upper branches were already in flood. Thanks, however, to the recent establishment of rating-stations in the upper parts of the basin, it is possible to make a fairly close forecast of the conditions at Yuma about two weeks before the arrival there of the flood-crest, and this gives time for interested persons to prepare for the emergency.

Electric Power in the Southern Appalachians.

A paper on this subject read by Mr. K. C. McMurray before the Association of American Geographers in 1922 is printed in the *Bulletin of the Geographical Society of Philadelphia* for January of this year. It shows in a striking way the great extension in the use of electric and especially hydro-electric power, which has taken place within the past two decades. Water power has long been a factor in the industrial development of the region, especially along the "fall-line" where the rivers descend from the piedmont to the coastal plain, and such power is still largely used directly at the point of generation. Between 1909 and 1919 the total power equipment of all kinds increased by 51 per cent., and this was almost entirely due to the growth of electric power, which in 1919 represented from 40 to 50 per cent. of all the power used both in North and South Carolina and in Georgia. It is especially the cotton manufacturing industry which makes use of this kind of power, which in North Carolina supplied 67 per cent. of all the power used by the industry. In Alabama about 80 per cent. of the electric power is furnished by the Alabama Power Company, and of this 23 per cent. went to the cotton mills, 15 per cent. to the iron and steel industry, 10 per cent. to coal-mines, and 8 per cent. to electro-chemical industries. Much electric power is also used by public utility undertakings in all the states of this region, and most of this is hydro-electric, supplied by widely distributed plants of very varying capacity. The drawback to hydro-electric power due to the fluctuating volume of the streams is got

over to some extent by the provision of steam-electric plants to supplement the power derived from running water, but even these require a large supply of water for condensing purposes. One of the most important installations of water-power is at Muscle Shoals on the Tennessee river, but the fluctuation of flow is here so great that hardly one-fifth of the total power is "primary," available throughout the year, and even with the supplementary steam-electric plants, more than half of the generating capacity is still "secondary," available for part of the year only, and its use must depend in part on the development of seasonal industries, in part on interconnection with other systems, taking advantage of the fact that the low-water period varies in different parts of the region. This development of water-power has by no means come to an end, many projects for further extension being on foot.

Navigation of the Upper Marañon.

The last issue received of the *Boletin* of the Lima Geographical Society (Tomo 40, 1923, Trimestres primero y segundo) contains the narrative of persevering efforts made during a number of years by Señor M. A. M. Muro to open up a water route from the more settled parts of Peru to the eastern plains by way of the Marañon. This river, as is well known, is obstructed by a number of rapids known locally as *pongos*, of which the Pongo de Manseriche, the lowest of the series, is the most famous. The dangers of the rapids have deterred most travellers from attempting any continuous navigation of the river, and to Señor Muro belongs the distinction, as appears from his narrative, of being the only man who has successfully surmounted the whole series of rapids both in the upstream and downstream direction. Having begun his investigations over twenty years ago his knowledge of the conditions of the river at various seasons must certainly be unrivalled, and he pays special attention to the changes to which the rapids have been subject, both within his own experience, and since the days of La Condamine and Humboldt. The changes dwelt upon in the earlier part of the paper seem to have been mostly in the direction of improvement of the conditions of navigation. Thus the Pongo de Rentema when seen in 1902 (exactly a century after Humboldt's visit) was free from obstacles, and marked only by the strong current. In other places too the action of the stream seems to have been in the direction of clearing away rocks and equalizing the fall. It is evident however that such action could hardly be continuous and universal, and a case is mentioned—that of the Pongo del Muyo—where the passage may become impossible through rocks brought down by a tributary, the Aramango, which enters here. As a rule the *pongos* are situated just below the junction of such tributaries, which occupy valleys between the successive parallel ranges, while the *pongos* are due to the passage of the main stream across such ranges. Any permanent improvement of the navigability would thus seem to be unlikely. Señor Muro's idea of ascending the whole series of rapids in a canoe was first put to the test in 1902, but an accident at the cataract of Mayasi frustrated his plan. It was successfully carried out in 1913 with the support of the Government, the chief difficulties then arising from the unusually high stage of the river, due to excessive rains. In the previous descent the rise had caused most of the rapids to disappear. During the war further efforts were impossible, but in 1918 Señor Muro effected the descent of the river in a motor boat which he had transported overland for the purpose, and which he loaded with goods for disposal at Iquitos. The conditions seem then to have been less favourable, in part owing to falls of rock as a result of earthquakes, and the voyage was beset with many dangers. Señor Muro strongly advocates the construc-

tion of a railway to this region by a route across the Andes which he claims to have discovered, and he dwells on the fertile soil and other natural advantages of the region which would thus be opened up.

POLAR REGIONS

The Oxford Expedition to Spitsbergen.

We are pleased to learn from a wireless message published in the *Times* at the moment of going to press, that this year's Oxford Expedition has been successful in effecting for the first time a crossing of North-East Land, the second largest component of the Spitsbergen group. The main party under Mr. George Binney landed on the east coast, and was picked up at Wahlenberg bay on the west coast, after a journey involving many difficulties through fog, crevasses, and melting ice and snow. Two other sledge parties, under Mr. Aldous and Mr. Frazer respectively, were also much hampered by fog, bad weather, and shortage of food for the dogs. The former reached Extreme Hook on the north coast, and the latter penetrated 60 miles inland. The sea-plane was carrying out the proposed aërial reconnaissance.

Russian Arctic Islands.

Through the courtesy of the Foreign Office we have received an intimation that, by a decree issued at Moscow on June 30, the following islands, namely Novaya Zemlya, Kolguev, Vaigach, Sengeiski, Dolgie, Matviev, Zelenets, and Merzhevets are, for purposes of administration, exploitation, and colonization, to be placed under a newly created "Islands Administration" with headquarters at Archangel. All but the first three are quite small islands.

The Political Status of Spitsbergen.

The treaty by which the sovereignty of Spitsbergen was conferred on Norway was signed at Paris on 9 February 1920, but its ratification was only effected at the end of last year, and the text printed (as Treaty Series No. 18, 1924) still more recently. By Art. 1, "The High Contracting Parties undertake to recognize, subject to the stipulations of the present treaty, the full and absolute sovereignty of Norway over the Archipelago of Spitsbergen, comprising, with Bear Island or Beeren-Eiland, all the islands situated between 10° and 35° longitude east of Greenwich and between 74° and 81° latitude North, especially West Spitsbergen, North-East Land, Barents Island, Edge Island, Wiche Islands, Hope Island or Hopen-Eiland, and Prince Charles Foreland, together with all islands great or small, and rocks appertaining thereto." A map is appended showing the application of the above names, with the French equivalents of some overprinted in red; it also marks the supposed position of White Island, east of North-East Land, which, if correctly placed west of 35° E., will fall within the limits assigned to the Archipelago. The other Articles are so framed as to put the nationals of all the contracting parties on an equality in regard to the rights to be enjoyed. By Art. 2 ships and nationals of all are to enjoy equally the rights of fishing and hunting in the territories specified and in their territorial waters, and any measures enforced by Norway for the preservation of the fauna or flora shall be binding equally on all. Subject to the observance of such regulations, duly recognized occupiers of land shall enjoy the exclusive right of hunting on their own land, within a radius of 10 kilometres round their business headquarters. By Art. 3 all shall have equal access to the territorial waters, and equal advantages for the carrying on of maritime, industrial, mining, and commercial operations.

No charges or restrictions shall be imposed upon any in the matter of trade which are not borne by the nationals enjoying in Norway the treatment of the most favoured nation. By Art. 4 all public wireless telegraphy stations shall be equally open to communications from ships of all flags, and from nationals of the High Contracting Parties.* Provision is made for the establishment of an International Meteorological Station under an organization to be agreed upon later. Acquired rights are to be recognized, and pre-existing claims to land are to be decided by a Commissioner to be appointed by the Danish Government, while mining regulations are to be drawn up by Norway but must be submitted to the other contracting parties before coming into force. The archipelago is never to be used for warlike purposes.

GENERAL

The "Prix du Travellers" awarded to General Bruce.

We record with pleasure the award to General Bruce of the prize recently founded by the *Union Géographique du "Travellers,"* which is to be given yearly to the traveller who, within the years preceding the award, shall have carried out an exploration remarkable for the importance of the discoveries made, or to the *savant* who during the same time shall have completed a geographical work of exceptional importance to the progress of Earth knowledge. The body in question is the scientific branch of the Travellers' Club, of 25, Champs Elysées, Paris, which has as its object the encouragement of travel by the holding of meetings and in other ways. The award of the prize (which takes the form of a money grant of the annual value of 10,000 francs) has been entrusted to the Paris Geographical Society, which, after due consideration of the claims of possible recipients of the honour, has bestowed it this year on General Bruce in recognition of the importance of the discoveries and other scientific results achieved under his leadership by the Mount Everest Expedition of 1922.

Early Cartography of British Colonies: Exhibit at British Museum.

A small but carefully selected exhibit of early maps has been arranged in the King's Library at the British Museum by Mr. F. P. Sprent, who has lately succeeded Mr. de Villiers in charge of the collection of maps at the museum. It has been suggested by the British Empire Exhibition at Wembley, and is designed to give the many visitors now in this country an illustration of the gradual development of the mapping of certain portions of the Empire from its first beginnings. The space available is too small to permit of comprehensive treatment, and the present exhibit is therefore restricted to certain selected areas, namely Australasia, the West Indies, and Canada with Newfoundland. The Australian maps are well chosen to illustrate the gradual improvement of the picture from the purely hypothetical view of a large land to the south of the Malay region displayed by the map of Arias Montanus in the sixteenth century, through the Dutch discoveries of the seventeenth, which culminated in Tasman's voyages, and the resulting first notions of an independent continental land in this region, to the almost complete picture supplied by the surveys of Captain Cook. And a similar gradual growth of knowledge is illustrated for the other two regions. Considerations of space have to some extent influenced the selection and made it necessary in one or

* This is the only instance of a privilege definitely extended to all nations, the rest being made applicable only to nationals of the High Contracting Parties, and (by Art. 10) to Russia.

two cases to replace original maps of large size by smaller copies which bring out the points in question equally well. The treasures of the museum in the way of rare maps have been drawn upon, and a welcome opportunity is thus given of inspecting some which are virtually unknown by reason of their scarceness. Such is the map of the West Indies to be found in one copy of the "Summarie and True Discourse" of Drake's West Indian voyage of 1585 preserved in the Museum Library, and other rareties are the Peter Martyr map of 1511, the world-map of Ortelius of 1564, and the plan of Sydney of 1788. We may hope that in course of time other parts of the Empire may be similarly dealt with.

International Geographical Congress at Cairo, 1925.

The project of an International Geographical Congress to be held at Cairo in 1925 was mooted over two years ago in circumstances which were briefly described in the *Journal* for June 1923 (pp. 441 *et seq.*). At first associated with the coming jubilee of the foundation of the Sultanieh Geographical Society of Egypt, it soon developed into a plan for the revival of the old International Congresses held in different countries before the war, being regarded by its promoters in Rome (where the Tenth Congress was held) as the eleventh of the series. Circulars of invitation were issued on this basis by a committee formed in Egypt, but it was pointed out that by the decision of the International Research Council, formed shortly after the end of the war, the constitution of the old Congress was abrogated, and that the duty of organizing future congresses should rest with the International Geographical Union formed in Brussels in July 1922 in affiliation with the International Research Council. A somewhat delicate situation thus arose which has since been happily regularized by the adhesion of Egypt to the International Research Council, and the issue of new circulars of invitation under the Statutes of the International Geographical Union. The Congress will take place (probably from April 2 to 12, 1925) under the patronage of King Fuad I., and will be organized by the Royal Geographical Society of Egypt, from whose members the Organizing Committee is chosen. The Secretariat and Inquiry office are installed in the premises of that Society in the Public Works Ministry garden, and a Handbook of Information has been issued giving details of the arrangements so far made. Tickets of membership will be issued at a charge of £1, and will confer all benefits in the way of reduction of fares by steamer and railway, etc. The meetings will take place at various centres in Cairo and Alexandria. A provisional programme has been drawn up, covering the various principal branches of geography and their subdivisions, and a scheme of excursions arranged, the two principal being, (1) that from Cairo to Aswân or Wadi Halfa, (2) that on the Gulf of Suez and the Red Sea. The Handbook includes useful general information on Egyptian matters, together with a geological map (showing routes of excursions) and a plan of Cairo.

OBITUARY

The Rev. G. D. Thomson.

WE regret to have to record the death, on 23 May 1924, of the Rev. George Dornin Thomson, which occurred at Albuquerque, New Mexico, from tuber-

culosis of the lungs. He had become a life member of the Society in 1911. Dr. Thomson was born in 1883 in Canton, where his father was an American physician. After being educated at MacGill University, Montreal, and visiting England, he returned to China in 1909, with his English wife, Margaret Everall. From that time on he devoted his spare time to the study of geographical conditions in the valley of the Yeung-Kong. He contributed to the *Journal* a short account of the limestone caves near the city of Yeung-Kong, which he believed to have been previously undescribed by a European traveller (Vol. 39, p. 156). Had it not been for his last illness, he had hoped to study the country between Canton and Tongking more fully. He leaves a widow and three sons.

CORRESPONDENCE

Steam Traffic on the Yangtze: Population of Szechwan.

IN answer to the correspondent who, in the June number of the *Journal*, queries my statements about these two subjects, as quoted in the review of my book on Szechwan in the *Journal* for January last, I should like to point out the reasons for my statements. The assertion I make that "steamers now run profitably between Ichang and Chungking, the winter months excepted" is substantially correct. Your correspondent writes that steamers run for *eleven* months of the year. This is undoubtedly true for some seasons, when the water is unusually high: but it not infrequently happens, as indeed during the past winter, that steamers are held up for many weeks through lack of water, and this cannot be very profitable. He goes on to say that steamers ply as far as Suifu on the main stream; and he may be interested to know that Pingshan Hsien, 70 miles above Suifu, has also been reached by steamer. On the Min river, the tributary which enters the Yangtze at Suifu, steamers ply, as he says, as far as Kiating, but, it must be added, only at high water and not regularly in winter. A light-draught steamer has ascended as far beyond Kiating as Meishan Hsien (the new republican name for Meichow), as your correspondent will find if he studies the anchors representing limits of river navigation on the new Commercial Map of China (Geo. Philip & Son), edited by me, 1922.

Your correspondent considers my estimate of 45,000,000 too low for the population of Szechwan. It is true that the Red Basin of that province is densely populated, but in the north and west are vast areas sparsely inhabited. Curiously enough, my estimate of 45,000,000, he will find if he reads my book itself, was corroborated by the "Mission Lyonnaise d'Exploration Commerciale en Chine," which made an exhaustive study of the matter and arrived at this figure independently of myself. Estimates, however, of the populations of every province, indeed of every city, of China are most uncertain. For instance, when I was stationed in Chengtu, the capital of Szechwan province, in 1903, the Viceroy was making a census of the families resident in the city. The result, he informed me, was 55,058. At the rate of five members to the family, which is the Chinese method of reckoning a census roughly, this gives some 275,000 souls in the city. For reasons given in my book, I reckoned eight to the family, giving 440,000. At its maximum the figure could not have exceeded 500,000. Yet I often heard foreign authorities, long resident in the city, casually citing its population as a round million! It is

not therefore surprising that, even in the latest Customs Returns, the population of the whole province should be quoted as 72,000,000.

ALEXANDER HOSIE.

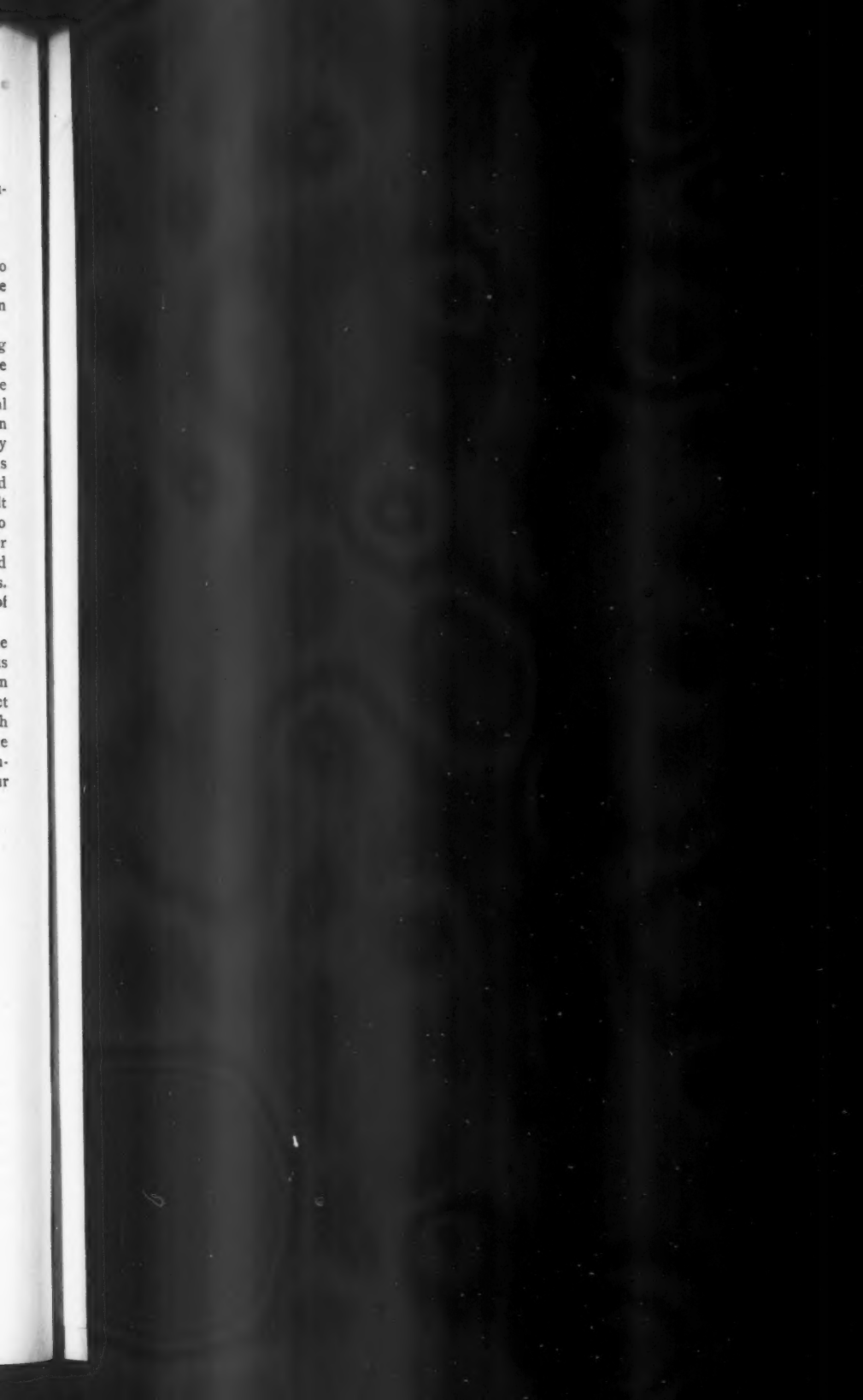
In the June number of the *Geographical Journal* a correspondent refers to Sir Alexander Hosie's statement in regard to the steamers operating on the Upper Yangtze. Your readers interested in the developments taking place in China may like a few figures.

Up to May 1920 there were two small steamers running between Ichang and Chungking. A friend of mine who had investigated the conditions on the Upper Yangtze, and who is at the head of the dockyard here, owned by the Chinese Government, and who is a Scotsman, designed a vessel for a local merchant firm. That vessel, which was much larger than any that had been considered practicable for navigating the gorges, went into service in May 1920, and proved a great success, financially and for transport. So great was her success that there was a rush on the part of other merchants to build similar steamers, and the yard which built that vessel has, since then, built fifteen similar vessels, six smaller vessels for service all the year round, two vessels for the run to Suifu, and two motor boats. In addition to these, other yards have built three steamers of the larger type, nine smaller steamers, and four motor boats; and the first-named yard has also built three oil-tank vessels. There are also on the stocks at present at least six of the larger type of steamer for the Upper Yangtze service.

These figures will confirm Sir Alexander Hosie's statements regarding the wonderful resources of the Province of Szechwan. The fact that the enormous increase in the transport facilities on the Upper Yangtze in four years has been unable to cope with the trade offering is some indication of what we may expect when that rich and wonderful country is fully developed and provided with adequate land transport. It has also to be borne in mind that the above increase in the trade of the province has been brought about in spite of continuous fighting between the various military satraps during the past four years.

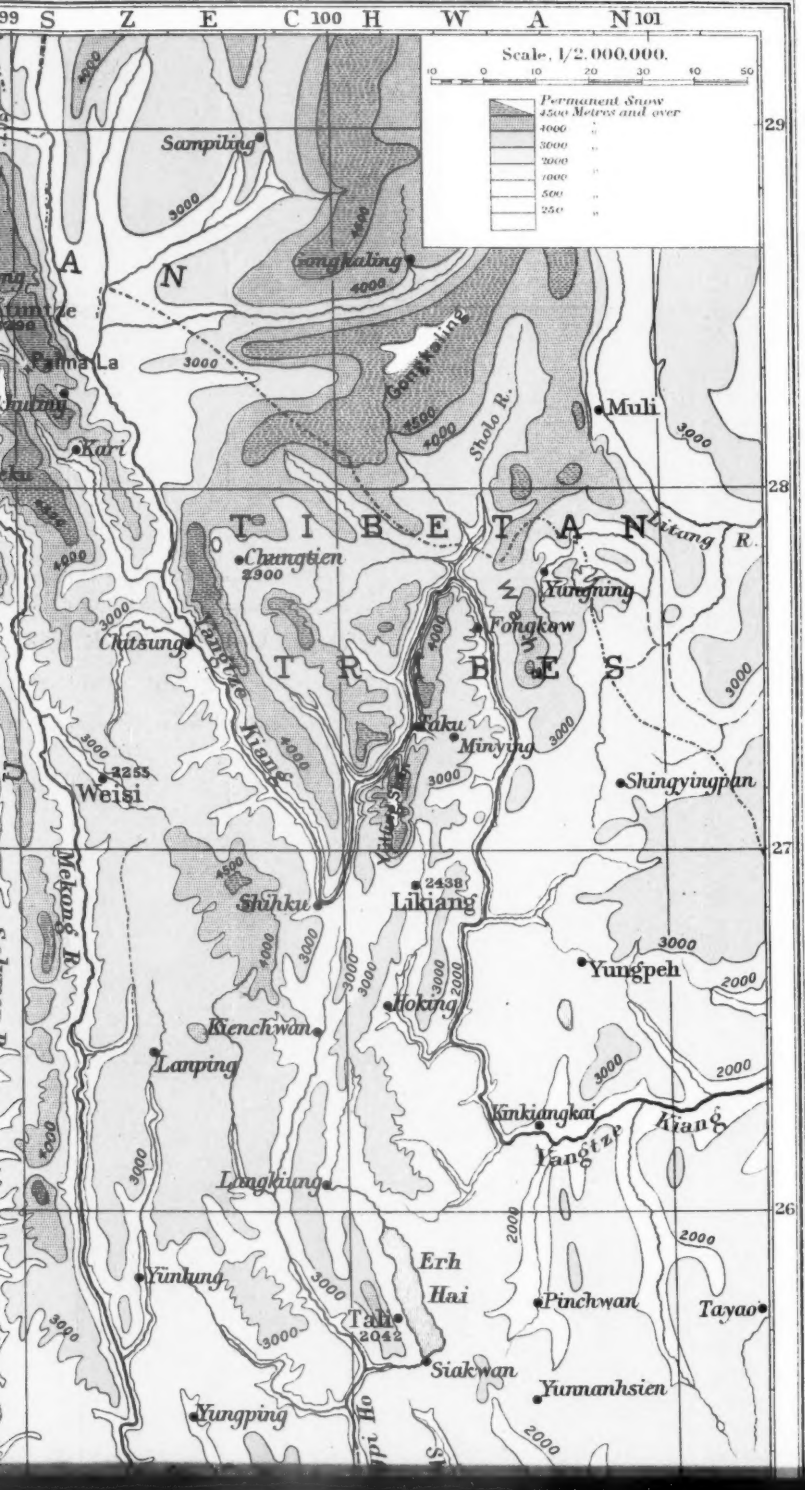
H. P. KING.

Shanghai,
25 July 1924.



Map to illustr
by
F. KINGDO
on
THE SNOW MOUNT

o illustrate the paper
by
. KINGDON WARD
on
MOUNTAINS OF YUNNAN



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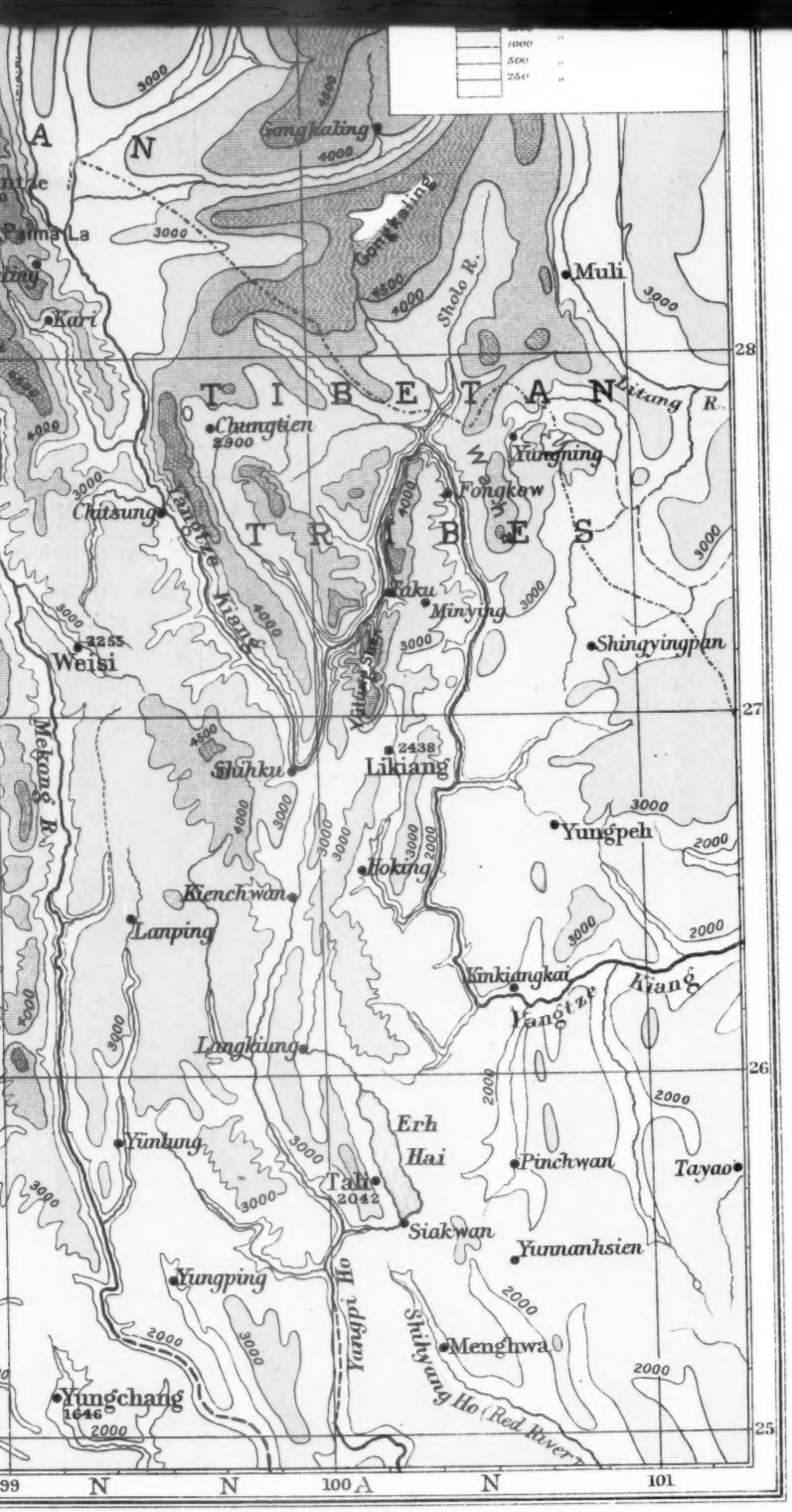

the Royal Geographical Society

YUNNAN.
Kingdon Ward.

SKETCH MAPS OF BURMA

to illustrate the paper by L. DUDLEY STAMP, B.A., D

Scale 1: 8,000,000

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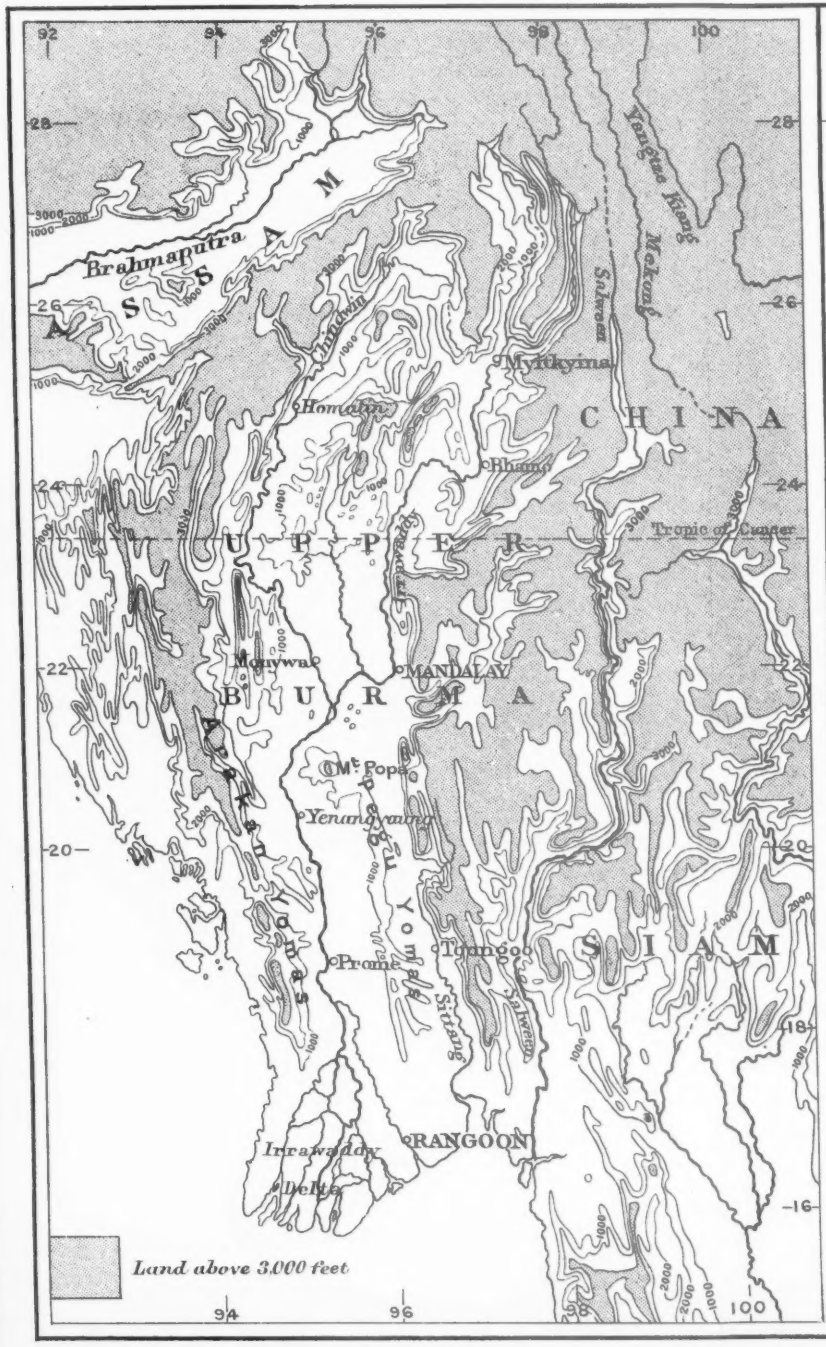
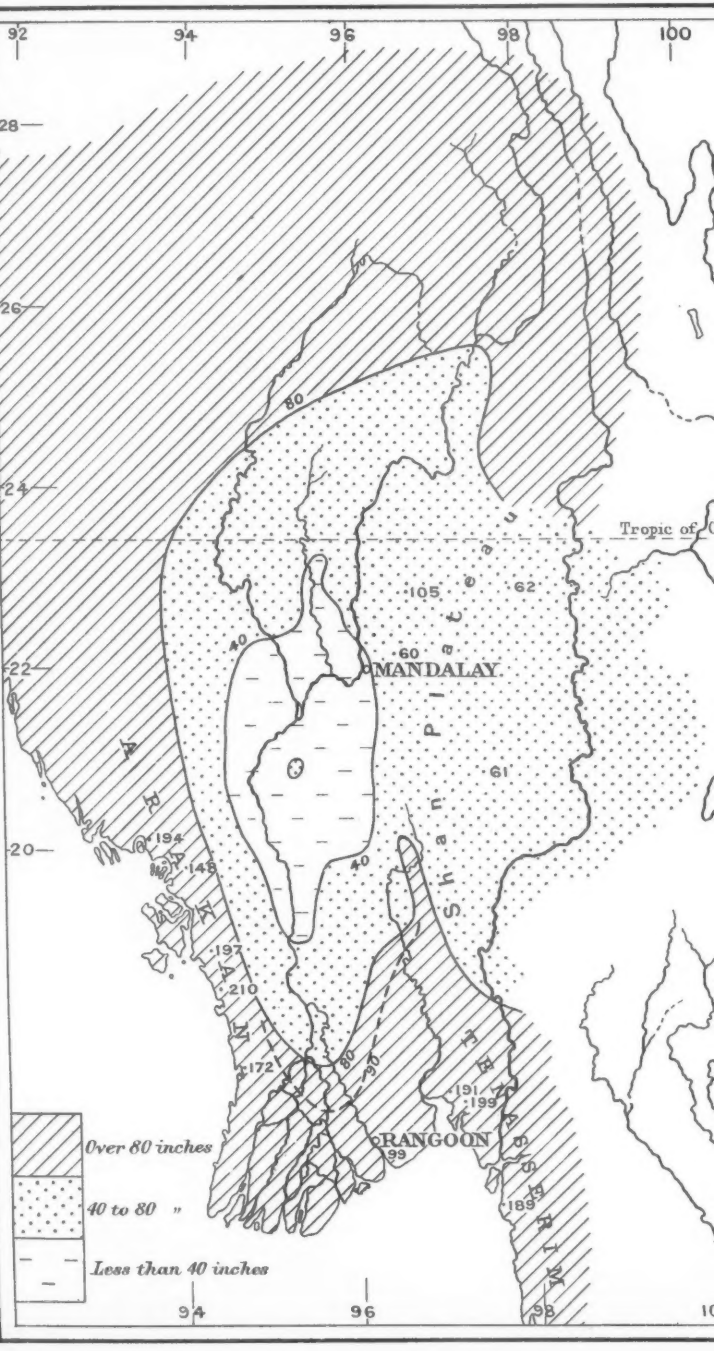


I – Relief



II – Rainfall

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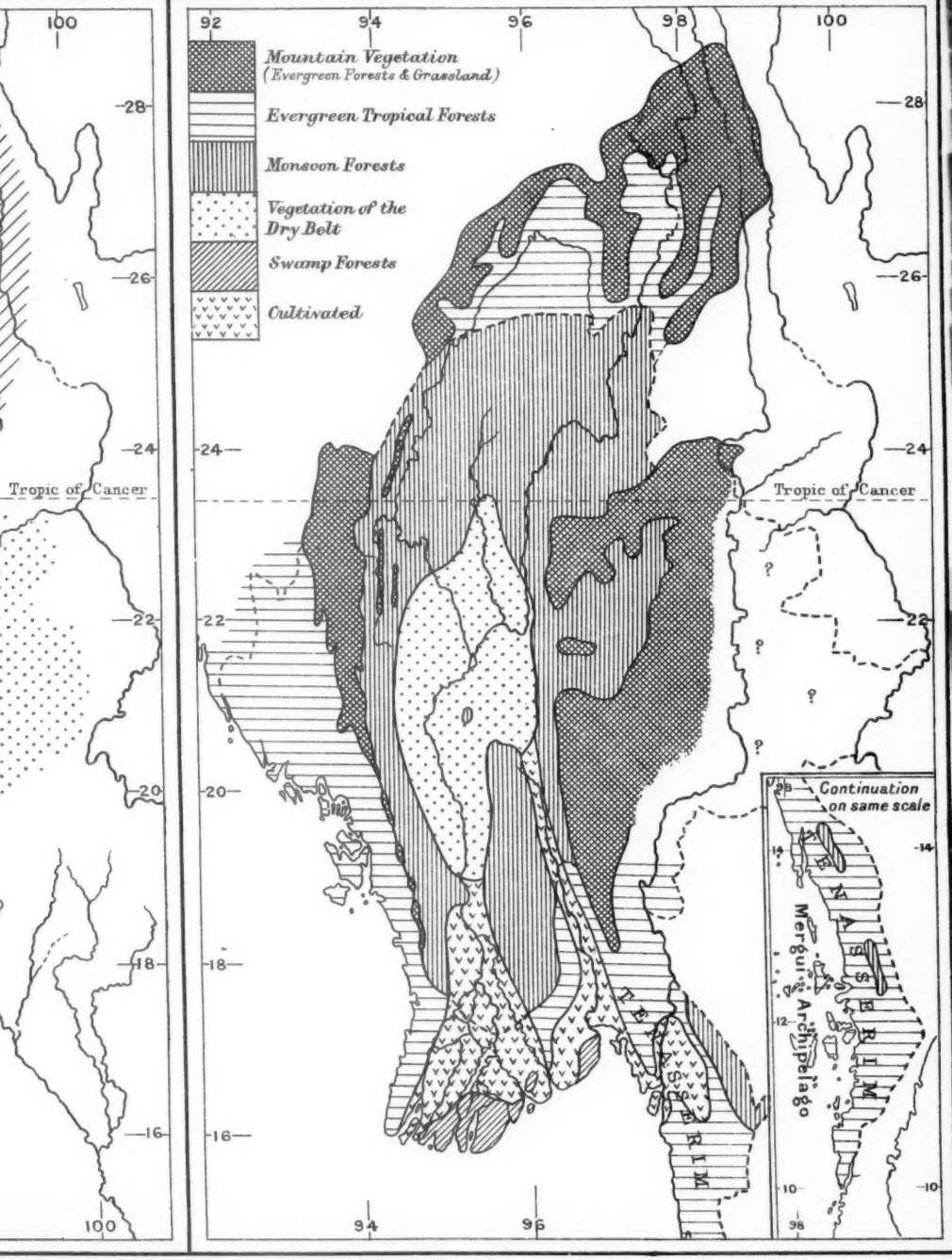

III – Vegetation

BURMA
Dudley Stamp.